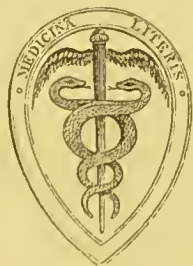


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A DISCOURSE
ON
THE ASIATIC CHOLERA,
AND ITS
RELATIONS TO SOME OTHER EPIDEMICS;
INCLUDING
GENERAL AND SPECIAL RULES FOR ITS PREVENTION
AND TREATMENT.

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“Salus populi, suprema lex.” — *Roman Maxim.*



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PREFACE.

THE attention of the legislature seems happily to be directed to the great and useful questions of sanitary reform, and the public may now fairly hope that, before many sessions have elapsed, the statute book will bear some strong evidences of the care of the British government for the health and domestic comforts of the masses of the people. The course of legislation, however, is proverbially slow, and we have in the meantime to deal with circumstances as they exist. There is an alarming amount of disease throughout the kingdom at the present time, and especially in London, where during the last month the mortality has more than doubled that of the same period of the year preceding; for instance, if we take the month of December 1846, we find, according to the tables of mortality,

that the deaths from epidemic and contagious diseases were about 676, and those from all causes not more than 4743, whereas in the month of December 1847 the mortality from epidemic and contagious diseases in the metropolis was 2859, and from all causes 9609, which is an enormous increase in the average of all seasons. In addition to these calamities we are threatened with that awful modern visitation, the Asiatic cholera. How the approaches of this disease may be retarded; how, under existing arrangements, its evils, if it should appear, may be lessened, are questions in the solution of which all classes of the community are equally interested.

Authors of scientific views have already applied themselves to the subject, and their works contain a multitude of theories and proposals supported with more or less of authority, both in argument and example; but it has struck the author of the present "Discourse" that a treatise which should practically and popularly embody the probable predisposing causes of the pestilence, the means that are most likely to prevent its assaults, and the treatment best calculated to mitigate its severity, would not be wanting in general interest nor yet prove an entirely valueless contribution to the medical literature of the day.

The limits of the following "Discourse" have prevented a recurrence to details which might have further illustrated the author's views, and added weight to his arguments; but the "Discourse" has no further pretension than that of furnishing some leading facts and general information on a subject to which public attention has been latterly directed, and of confirming in the public mind a due sense of the importance of sanitary regulations, and a careful regard to drainage and ventilation, as well as to habits of temperance and cleanliness, with a view not only to the mitigation of cholera, but of epidemic diseases in general.

LEAMINGTON SPA,

Jan. 8, 1848.

A DISCOURSE

ON THE ASIATIC CHOLERA,

ETC.

FEW epidemic diseases have probably excited deeper apprehensions—few have been more fatal in their results, or have baffled the expedients of scientific men more than the Asiatic cholera. All have been attended with a greater or less degree of human suffering and danger, but the malignity of cholera has far outvied, both in symptoms and consequences, the other “thousand natural shocks which flesh is heir to.” The human mind seems to have an intuitive propensity, for dreading new and “untried dangers,” and also, for reconciling itself to those, with which habit has rendered it familiar: these tendencies will, in a great measure, account for the unrivalled consideration awarded to the first visitation of this great national scourge. Long before it reached Europe, its advent was predicted; and exactly fourteen years after its birth in the Delta of the Ganges, it landed on the shores of England. Its origin in our oriental territories, its wayward yet determined progress across the globe, the novelty of its symptoms, and its rapidly fatal effects, invested it with a gloomy interest, the parallel of which is, fortunately, only to be found in the chronicles of the ‘Black Death’ or the ‘Sweating Sickness’ of the middle ages.

Fourteen years have not yet expired since the epidemic cholera quitted this country. After fulfilling its mission of death in the western hemisphere, and after completing, as it were, the very circuit of the globe, it has again penetrated into the heart of Europe, which, with a recurrence of bygone forewarnings, cannot but convince the most sanguine that we are imminently threatened with a second invasion of the disease.

Let us entertain a hope that the experience we derived from our earlier acquaintance with the epidemic, will enable us both to contract the sphere of its ravages, and to mitigate its severity, should it again appear amongst us. It is much to be deplored, however, that no comprehensive system of sanitary protection has hitherto been adopted, which might have *insured* us against a repetition of the former disastrous mortality.

It cannot be denied that civilization, including nearly every branch of human knowledge, has made a rapid and luxuriant growth during the present century; at the same time there is good reason to believe that, in consequence of our unwearied struggles for mercantile greatness and manufacturing ascendancy, a population singularly prone to disease has multiplied, and extended far beyond the existing means of sanitary protection. Few, however, will call in question the advantages which, as a nation, we derive from manufacturing industry; but, in order to prevent occupation of this kind operating prejudicially upon the physical welfare of those that are so employed, it ought to be conducted on carefully organized sanitary principles.

It would be found very much to the interest of the wealthier classes in manufacturing towns, and other populous districts, if they exercised their judgment and superintendence towards carrying out those arrangements which would most effectually promote the greatest possible amount of comfort

and cleanliness in the dwellings of their poor dependents. At all times, and under all circumstances, the systematic practice of such solicitude would be productive of the happiest results ; but in those perilous seasons when pestilence travels abroad on the wings of the wind, it would furnish the sedentary artisan of the crowded town with some portion of the advantages enjoyed by the more favoured denizen of the rural districts. "Suffering among the poor," says Mr. Archibald Alison, "like contagious fevers, never remains stationary ; if it is not checked, it spreads its ravages. If the rich will not relieve its distresses, they will speedily be made to feel its bitterness."

Although the Asiatic cholera excites an universal dread, it is not a little singular that its attacks, over a given space, have hitherto been more limited in their number than those of any other great and strange epidemic upon record. In the genuine spirit of tyranny it assails the defenceless, and, as a general rule, the outcast, the wretched, and the destitute are its peculiar victims. Statistical observations, made upon an extensive scale, have shown that the proportion of those affected by the disease, amongst the better classes of society, is as one to ten thousand, whilst among the lower orders the average attained is as one in every one thousand of their number. Should this statement meet the eyes of any who may be comprehended in the latter section, let them not be disheartened, for they may rest assured that comparative poverty alone will not inevitably render them more liable to the disease. There are other predisposing causes, which a deeper inquiry into the subject will readily unfold, and it will be found that temperance and chastity of conduct, with ordinary individual precautions, will prove, in the main, as good a protection as wealth and luxury.

The greater susceptibility to pestilential impressions which has been ascribed to poverty, does not apply to persons of

humble means, when associated with careful and industrious habits of life ; it is rather the penalty of reckless dissipation and debauchery, which operate more prejudicially and more extensively than may at first sight appear. There are, no doubt, many amongst our teeming population, and that more particularly in Ireland, who are exposed to the debilitating influence of absolute want; but if we take into consideration the numberless ways and means of employment, together with the general condition and wages of the industrial classes of this country, it will be found that, collectively, they are very far removed from extreme destitution ; and that penury, where it occurs, may be traced to the fault or vice of the individual, and is but seldom the result of inevitable misfortune. If, for example, the head of a family in the labouring classes squanders his earnings on drinking, and its attendant vices, he not only does an injury to himself, but deprives his wife and children of an adequate supply of food and raiment, in most seasons essential in our damp and variable climate, but more especially so when epidemic pestilence is raging around them. We are not to suppose, however, that the mass of the people who live by the 'sweat of their brow' can provide themselves with any comprehensive measures of sanitary protection ; neither, in general, can they discriminate as to the quality of their food ; yet these are points of fundamental importance in securing the general welfare and exemption from disease. It becomes, then, the imperative, as well as the self-interested duty of the well-educated and more enlightened members of the community, to assist and instruct their inferiors on these matters, when so destructive a malady as the Asiatic cholera hovers over their dwellings.

The ill-fed, and the impoverished, are more exposed to the assaults of this epidemic, because the digestive organs and the blood are principally affected by it. In infected localities, certain chronic disorders which prevail amongst the poor, may, by an easy transition, assume the malignant

attitude of cholera ; hence, under such circumstances, they should be studiously and promptly corrected.

The specific cause of Asiatic cholera is, no doubt, to be sought for in the atmosphere ; but the precise condition upon which it depends has, in common with the ‘*materia morbi*’ in other epidemics that arise spontaneously, so far escaped detection. I may here observe, that Dr. Prout noticed a considerable increase in the weight of the air during the time that cholera prevailed in London, and this observation has been verified by similar discoveries made elsewhere.* Both in Asia and in Europe, fogs of an unusual kind, and of a very offensive odour, have presented themselves on its line of march. These atmospheric peculiarities and contaminations will, perhaps, hereafter become the subjects of more successful scrutiny.

However imperfect our acquaintance may be with its specific cause, we know full well that the malady selects for its peculiar residence the organs that are seated within the abdomen ; it is by no means a necessary inference from this fact, that the poisonous miasma of the disease should be directly applied to them in the first instance ; on the contrary, we have much better grounds to believe that the initiative step of the process takes place in the lungs, and that the germ of the disease is THERE sown in the blood. This view of the subject appears consistent, by reason of the deranged state and altered composition of that fluid in all persons shortly after being struck by the pestilence. The vital cohesion with which healthy blood is endowed, seems altogether lost under the baneful infection of the Asiatic cholera. In the stage of collapse, the vital stream refuses, as it were, to circulate within its accustomed channels, and by some

* Professor Casper, of Berlin, in his *Researches on Health*, made on an enormous scale, has ascertained that a high barometrical pressure tends to increase, while a low barometrical pressure tends to decrease the rate of mortality.

specific tendency, its watery portion is thrown forth through the textures of the stomach and alimentary passages, and is thence discharged in frequent and violent gushes, both by vomiting and purging. In the meantime, the organic functions of the body are suspended with one accord, and a train of symptoms is presented, so uniform, yet so anomalous, that they usually excite the utmost surprise and consternation. Other epidemic fevers, however intense, however malignant, however fatal, are far less terrible than are the characters of this strange disease. In the former, our hopes are in general sustained by one prominent sign of vitality, which is heat; and although the blood flows in a burning tide through the frame, yet the parching breath of fever is far more tolerable than the cold, clammy skin, together with the icy tongue and respiration of Asiatic cholera.

An entire suppression of the organic functions, with but very rare exceptions, attends the stage of prostration which I have just partially attempted to delineate. The functional powers both of the liver and kidneys seem to be more especially paralysed—the urinary bladder shrinks into the smallest possible compass, and remains entirely empty during the stage of collapse. This inactive condition of the liver has induced several eminent writers, of whom I may mention Dr. Watson, of the Middlesex Hospital, to call in question the propriety of the name which has been given to this distemper: the basis of the objection being, that the term cholera is derived from the Greek $\chi\omega\lambda\eta$, which signifies bile, and which has hitherto only been applied to that form of disease which is distinguished by an exorbitant secretion of that fluid; whereas in the epidemic under consideration the liver, as before remarked, fails to supply this its natural tribute. There are arguments, which I have not space to enter upon, that tend to uphold the pertinence of the nomenclature, by tracing it to a somewhat different etymological source. If the name conveys an erroneous impression as to the patho-

logy of the disease, it is the more to be wondered at, seeing that in India, where both originated, the great majority of cases proved fatal in the stage of collapse, or during the total absence of bile.

We have strong presumptive evidence that the special poison of the epidemic gains admission into the vascular system in the organs of respiration; and that a preliminary change in its constitution is at once effected, whereby the blood is rendered unfit for the accomplishment of those purposes which severally administer to secretion, nutrition, and assimilation.

In the midst of this distempered state of the blood, and the general disturbance of the circulating and digestive organs, we find the sensorial powers less impaired than we might have fairly anticipated. Some persons, however, have been paradoxical enough to consider the epidemic cholera as a primary affection of the brain and nervous system; those who entertain such a belief may be said to grasp a link in the morbid chain; but reason and analogy afford us every assurance that it is not the principal one. It may be advanced, with some semblance of plausibility, in support of this doctrine, that the disease seems more disposed to attack those in whom it excites the greatest fear and apprehension. This argument I believe to be as fallacious as it is superficial; for I have previously stated the largest proportion of cases are found to arise under circumstances of the greatest misery and destitution; where the great mass of victims to this destroyer is to be sought for, there we find the nervous system the least sensitive, and the mind the most indifferent to the impending danger. We have just reason to conclude that cholera, whatever may be its essential principle, impregnates the blood at its earliest onset, and that in doing so it acts in conformity with laws which govern the impressions made by all other diseases which arise from malaria.

It may startle some of my readers who are not conversant

with pathological science, to learn that malignant cholera has been identified in its nature with that class of diseases comprehended in the term fever. Although in India the febrile stage was seldom fully developed, many of the more reflective portion of the medical profession, who keenly noted the rise, progress, and occasional issue of the disease, soon arrived at the foregoing conviction; and the late Dr. James Johnson gave it the specific denomination of "epidemic choleric fever." The following quotation from the writings of Dr. J. Gillkrest, deputy inspector of hospitals, on epidemic yellow fever, can hardly fail to recal to our mind a resemblance between the more rapid and deadly form of that disease and the ordinary phenomena of Asiatic cholera. He says,—

"The deadly nature of the attack seems to be marked in strong characters in the countenance of the patient from almost its very commencement. The features seem SHRUNK, DECOMPOSED. There is usually little or no vascular excitement; and the surface is temperate, sometimes below the natural standard, from the commencement of the attack."

In a subsequent sentence he states, that "hiccup generally sets in soon, with LIVIDITY and coldness of the extremities, only equalled by that which occurs in the worst forms of cholera. In this state the pulse can scarcely be felt at the wrist, sometimes not at all." In another passage, by the same author, we are informed that "the ears and extremities assume a leaden colour; suppression of urine takes place, and the 'black vomit,' with the acrid sensation of the stomach, may set in, which close the scene, not unfrequently within forty-eight hours." Again, speaking of the skin, he tells us, "it is so cold and CLAMMY as to give a shock to those who touch it; when asked a question, the patient seems to understand its meaning, and usually gives a pertinent answer." The latter remark applies also to cholera.

Fever assumes so many, such questionable and Protean shapes, that could we but withdraw its numerous species from our nosological list, our ailments would be comprised within a very limited circle. A celebrated physician of modern times seems to have been so thoroughly impressed with the truth of this doctrine, that, in his general opinions upon physic, he regards some degree of fever as the essential principle of nearly all diseases. In support of this statement, I may refer to the lectures and writings of the late Dr. Armstrong, which still maintain their pristine reputation, and have the highest pretensions to originality. With a view to exemplify this subject still further, I may mention that the late Mr. Abernethy inculcated the belief that no local disorder, whether internal or external, could exist without inducing fever; and likewise that fevers, springing from an atmospheric or any other external cause, have the reciprocal tendency to generate local mischief. I cannot pass by without remark the bold and decisive views which have been launched into the world at a later date by Dr. Samuel Dickson, under the title of the “chronothermal system;” the tenour of which is to establish the fact of an unity of action in all disease. During the time that Dr. Dickson was stationed in India, he says that he had ample opportunity of ascertaining the nature of cholera. To transcribe his own words, from his work styled “Fallacies of the Faculty,” “Tremulous and “spasmodic action are equally symptoms of ague and “cholera; nausea and vomiting characterize both. The “ague patient has sometimes diarrhœa or looseness; oppression of the chest and coldness of the whole body are the “primary symptoms of each.” Although the principles taught by Armstrong and Abernethy correspond in a great measure with those of Dickson, the latter has given them at once a more definite and comprehensive meaning; for he emphatically declares that intermittent fever or ague is the

type of all other diseases. Dr. Dickson further states,—
 “More than twenty-three centuries have elapsed since Hippocrates distinctly enunciated the unity of morbid action.
 “His words are ‘the type of all diseases is ONE and identical.’”

By the foregoing and subsequent arguments and illustrations, I intend to show, that whilst cholera displays great eccentricity in its symptoms and habits, and has hence been considered as a disease *sui generis*, there is to be found a natural relation subsisting between it and fevers, as we have hitherto been acquainted with them, especially with those of an epidemic kind.

The points of difference, as well as resemblance, between Asiatic cholera and other pestilential diseases are alike pregnant with interest. Its chief dissimilarity to all others consists in the peculiar destiny by which, within a few years, it has been carried into every quarter of the globe. It is somewhat remarkable that Australia, I believe, has hitherto remained free from its invasion. The geographical extent of its diffusion seems one of the most striking characteristics of the epidemic. Cholera differs also from other epidemics in the irregularity with which it sometimes pursues its march, as well as in its caprice in fixing upon isolated, and often very circumscribed localities. In some instances, however, the epidemic evinces a regular rate of progression; and this was particularly observed shortly after it broke out in Bengal in the year 1817. In some districts of that province its course across the country was correctly calculated, and was found to be at the rate of about one degree per month. Its subsequent itinerary did not preserve the same uniformity; on the contrary, the epidemic was frequently found to alight on spots more or less remote from its origin, leaving large intervening communities untouched.

By accounts lately received from Russia, we learn that in

its attack upon Saratov the Asiatic cholera has this year (1847) spared the colony of Sarepta, which was also the case in 1830. The district, we are, informed, abounds with salt springs.

It is by no means improbable that certain geological strata and subsoils may have the power to neutralize or restrain the dissemination of the specific miasm. The Asiatic cholera, as some of my readers may remember, reached England in November, 1831. It broke out first in Sunderland, and not many days afterwards it made its appearance in the neighbourhood of Edinburgh, at a distance of 140 miles. I happened at the time to be studying at the University in the latter city, and had for several months ample opportunities of witnessing the disease in all its shades, from its mildest to its most malignant forms. I neither knew nor heard of an instance where cholera was propagated by contagion during its stay in Edinburgh; and I am certain the general belief was to the contrary amongst professional men. The advocates of contagion might, perchance, maintain that the cholera was imported from Hamburg, or some other foreign sea-port, into both Sunderland and Edinburgh at nearly the same time. There is, however, no evidence in proof of such an assertion; and if there were, I think it will be seen from the sequel of this discourse that the disease does not depend for its diffusion in any region or locality upon a contagious propagation from one individual to another. The question of contagion, in general, is a very unsatisfactory and obscure one: all, however, must admit, that as its potency varies in different diseases, so does it vary in the same disease at different times, and under different circumstances. From a considerable amount of testimony, I believe the contagious properties of cholera are at all times extremely faint—so much so, indeed, that, of the immense numbers who in a great diversity of climate and situation

have been exposed to the effluvia exhaled from large bodies of cases collected in hospitals, but very few have been affected. This was remarkably the truth in Russia, and especially at Moscow: so strongly convinced were the physicians of that place, of the noncontagious properties of cholera, that they purposely exposed themselves to the emanations from the bodies of the patients; some went so far as to inoculate themselves with humours taken from the dying and the dead, even selecting them from the worst cases. Several striking instances are recorded in the official report of the cholera at Dantzic by the late Dr. Hamett, which tend to disprove the power of contagion in this disease; for example, he says, "A clerk to a hospital at Moscow was ordered to accompany a vehicle laden with the linen, bedding, &c., belonging to the cholera patients of the hospital, to a distance of five versts from the city, in order to be burnt, according to the regulations at the breaking out of the epidemic. The weather proving bad, and the man being exceedingly fatigued, he was induced to mount the vehicle and lie upon the contents, where he remained six hours, without being attacked afterwards." I shall cite another even more remarkable instance from the same author, which occurred in the military hospital at Dantzic: "Immediately after the decease of a cholera patient, one of the male attendants lifted up the corpse by the shoulders, the head of which fell suddenly back, and a stream of vapour was ejected from the mouth on the face of the bearer, who involuntarily inhaled it. The man had in consequence dreadful nausea and repeated vomiting, but no attack of cholera."

In a "Notice of Cholera," as it appeared at Colombo, in Ceylon, this year (1847), Mr. A. Browne, surgeon of the 37th regiment, says, "Cholera had prevailed in the 15th regiment at Kandy for some time before it appeared in the garrison of Colombo, though there is daily communication between

“ these towns by travellers, mails, and merchandise ; and
 “ had the disease been transmissible by such means, there
 “ was no obstacle to its advance on the capital.” He, likewise, states that, throughout the epidemic period, those soldiers from the barracks, about 120 in number, who took it in turn to attend upon their comrades in the hospital who were suffering from cholera, escaped the disease. According to the same account, the epidemic did not afflict the women to the same extent with the men, although they were incessant in their attention upon their husbands, when suffering from the disease. The following passage from Mr. Browne’s communication is, in my opinion, singularly significant of the general and special etiology of the Asiatic cholera :—“ The proportion,” says he, of “ attacks and
 “ deaths among the duty soldiers, who were exposed to the
 “ night air on guard, was nearly four times as great as among
 “ the recruits and others who did no night duty, though
 “ their relative numbers in the regiment were only as five to
 “ three ; night exposure, therefore, must have had a marked
 “ influence in augmenting the frequency of attacks ; and few
 “ will be of opinion that contagion is more active in the
 “ open air, and in large unfurnished guardhouses, than in
 “ comparatively crowded barrack-rooms, the common residence of both classes.”

However important quarantine regulations may be considered by some governments, it is quite certain that the great highways of human intercourse have not been the conductors of this epidemic to its several destinations ; contagion, indeed, seems to have exercised but little, if any influence, in promoting its extension. If we trace its course along the Persian Gulf, and its subsequent entrance into Syria, in the year 1822, we shall find that, instead of following up its direction into the adjacent and populous territories of Turkey in Europe, with which country and the in-

fectured districts an incessant traffic was going on, it wended its devious way towards Astrachan, and pursuing for a certain time a north-easterly course, the cholera arrived at Orenburg, in the year 1823 ; at which period it also attacked a few other towns on the Russian frontiers, halting, however, on the Asiatic side of the Volga. The further progress of the epidemic seems to have been arrested in that quarter, probably owing to some change in the meteorological condition of the atmosphere, by which, either alone, or by other conjoint agencies, the force of the malaria was temporarily suspended, or rendered inert ; we can hardly use the term destroyed, for in about five years afterwards—viz., in 1828—the disease actually reappeared, and spread from the point at which, in the year 1823, it had subsided.

With respect to the ‘*vexata questio*’ of quarantine establishments, there can be no doubt that their utility was in the olden time very much overrated ; and I think now it may be fairly advanced, that if an epidemic disease, whether contagious or otherwise, possesses a tendency to migrate, no sanitary cordon can prevent its doing so. M. Bouilland, an eminent scientific authority, has gone so far as to pronounce the existence of contagion one of those “ unscientific superstitions of which it is to be hoped the world will soon be “ rid.”

In reviewing the history and progress of the cholera, it does not appear that those countries where the system of quarantine is the most rigid have fared better, or been more exempt from the disease, than those where the intercourse is the most free and uninterrupted ; indeed, it has repeatedly happened under the latter circumstances, that no communication of cholera has occurred. We have no just cause to presume that England owes her immunity from the plague during the last and current centuries to her quarantine code, which is proverbially less stringent than that of France and

other nations; whilst, at the same time, the nautical traffic which is daily carried on between the British islands and many ports of the Mediterranean, where the plague often rages, I maintain that the most favourable opportunities must have been afforded, if it had had the tendency, for its passage to this country. We heard of cholera whilst afar off with terror and dismay; whilst plague, though raging at no comparative distance from us, excited not the smallest apprehension; and yet the contagious qualities of the latter disease are much more intense than those of Asiatic cholera. We dreaded the approach of the latter epidemic from an imperative conviction of its locomotive impulses.

It may be asked by the disciples of the school of contagion and fomites, by what means the cholera found its way to the islands in the Indian seas, as well as to our own shores; moreover, how it accomplished its voyage across the Atlantic to America? We may be told, too, that the malady had no existence in Portugal until the period when a steamboat arrived from England, having troops on board, in the beginning of 1833. The disease was then prevailing in England, and in the port whence the steamboat took its departure; it was found in the vessel at the time when it reached its destination, and it subsequently spread into the interior of Portugal. In reply to the questions above proposed, as well as in explanation of the incidents last narrated, I shall merely state it as my belief that the choleric aura, whatever may be its true nature, is endowed with a propensity to traverse the atmosphere in certain directions; that it likewise has an inherent tendency to centralize itself for a time in localities which are congenial to its nature, and which are often very circumscribed; that in general this tendency is influenced by the geological character of the subsoil. I believe that it obeys the same laws of affinity, whether passing over sea or land, and that a ship coming

within the range of its action is quite as likely to become the object of its attraction and attachment as any isolated locality or human habitation on shore. If, as seems to have been generally represented, the disease associates itself more particularly with damp and putrid emanations, I should be inclined to pronounce the bilge water, which exists more or less in the hold of every ship, as an auxiliary calculated, above all others, to foment its virulence ; whilst the stagnant and vitiated air in these floating places of abode, especially when filled with troops, affords a most suitable element for the operations and ravages of the disease. We are told in Hufeland's Journal, 1834, that cholera suddenly appeared in some vessels on the river Elbe, which had held no communication whatever with any infected place. "It seems to be a general law of nature," observes Sir Gilbert Blane, "at least among the mammalia, that accumulation and stagnation of the exhalations of the living body produce disease. The glanders of horses only arise in large stables, and the distemper of dogs, in kennels. During the American war, it was proposed to send live sheep from England across the Atlantic. In a few weeks, in consequence of being crowded in the lower part of the ship, they all died of a febrile disorder." The same arguments which are adduced to explain the mode by which cholera is propagated to other insular districts, will hold good with reference to America. It may be said that the material of the epidemic does not confine itself to persons or clothing, but that, as it forms a temporary morbid constituent of the atmosphere which surrounds and penetrates a ship, so it affects houses in precisely the same manner.

The probability is, that during a sea voyage, the epidemic miasm may appear to cling exclusively to a certain vessel ; this may arise, however, from there being no other object within the sphere of its influence to which it can transfer its

affinities. As soon as the vessel becomes stationary at the port to which it is bound, the migratory habits of the epidemic again manifest themselves, but not unless the meteorological state, or constitution, of the atmosphere, together with other circumstances of a local nature, are such as to favour its extension. From all the information that I can gather upon the subject, I am disposed to entertain the opinion that there are epidemics—cholera being one of them—which are impelled by the nature of their constitution to migrate, and that, whether upon island or continent, they will work their way in defiance of all human restrictions.

Dr. Russell, who practised medicine at Aleppo for many years during the last century, tells us, that even in the plague which prevailed in that place, and to the nature of which he devoted the most zealous investigation, “although he had reason to believe in the existence of its contagious properties, yet that he considers them very faint,” and expressly adds, that “at the commencement of its epidemic ascendancy, when the cases were most virulent and fatal, proofs of contagion were entirely wanting.” He infers, also, that without a PESTILENTIAL CONSTITUTION of the atmosphere, the disease can at no period, and in no place, be propagated as an epidemic.

Upon reviewing the arguments and instances which I have already adduced upon the subject of Asiatic cholera, together with a vast quantity of others which I have not space to introduce, I am constrained to determine that its diffusion by contagion is so improbable, that we may safely banish from the mind all apprehension of danger from that source. To some, this corollary may appear consolatory; to others, less so. In one point of view, the disease may be regarded as an unavoidable destiny; in another, as an evil, to escape which we have only to call into requisition those means and appliances of which I propose to treat, both collectively and indi-

vidually, in a subsequent page, and which the voices of reason and science have announced to us as stronger bulwarks of defence and safety than the most rigid system of quarantine which human ingenuity can devise. The day of the red cross, the yellow flag, and the lazaretto, has, I believe, nearly expired, and future generations will perhaps ridicule them amongst the most striking specimens of the absurd customs of their ancestors.

In concluding the subject of contagion, I shall transcribe a passage from the writings of Dr. Cowles Priehard, of Bristol. With reference to the sanitary laws of France, he tells us, "the code at present in force was enacted in 1822, which, though an ameliorated form, is pronounced by an able and judicious writer to be an atrocious system, bearing the impress of terrors, which held in thralldom the minds of its enactors, and totally erroneous on most of the principles on which it is founded. A petition," says Dr. Priehard, "was in the year 1833 presented to the Chamber of Deputies, drawn up by M. Chervin, praying for a mitigation of this law. The prohibitions against intercourse laid down in the French code have reference to several diseases not regarded as pestilential by those who framed the quarantine laws of England and some other countries. The existence of yellow fever, lepra, typhus, cholera and plague, in any place, is considered as rendering communication dangerous. Of these diseases," says M. Chervin, "the *four first* are certainly devoid of any contagious property."

We may regard the more malignant epidemics as analogous to those violent tempests and convulsions which from time to time distort the face of nature. I believe their causes, even if well ascertained, are too powerful for man, although armed with all the muniments of science, to extinguish. At the same time, I am confident the means are

within our reach, by which we may fortify ourselves, both as nations and as individuals, so far, that we may materially mitigate the destruction which threatens us from these sources—to continue the metaphor, if we cannot prevent, we may—

“ Ride upon the whirlwind, and guide the storm.”

Although the malignant cholera is justly viewed as a novelty amongst European diseases, and its modern origin is clearly traceable to its parturition in the East in 1817; there are Hindoo records of admitted authenticity, which render it certain that former generations were no strangers to its existence at an earlier age, both in India and China. The epidemic seems, however, until late years, to have been satisfied with a residence in its “ fatherland.”

It is now generally supposed that cholera belongs to that class of diseases which has been termed zymotic or fermentative; hence, it is allied to small-pox, measles, scarlatina, syphilis, typhus, malignant yellow fever, influenza, plague, &c. The best testimony tends to show that most of the diseases here enumerated evinced far greater epidemic intensity and power of diffusion in by-gone days, or at the eras when they first appeared, than they are found to evince at the present time. It is not, I think, unworthy of notice, that these diseases engender, during their course, a morbid material peculiar to each, either in the tissue of the skin, or mucous membranes, and sometimes in both. These products may convey the several diseases from which they spring to healthy persons; but in order to do so, they may require different modes of application, and in all probability the degree of infectious property appertaining to each product may depend upon a more or less perfect process of maturation.

It cannot be said that cholera is attended by any external eruption; but Dr. Horner, Professor of Anatomy in the

University of Pennsylvania, alleges that he repeatedly found, in his *post-mortem* examinations of cholera patients, “a copious vesicular eruption (entirely distinct from the mucous follicles or glands) which pervaded the whole alimentary canal.” He likewise found “exfoliations of the epidermic lining of the intestines, by which the extremities of the venous system were left open.” These observations correspond in the main with those of M. Bœhm, an eminent German anatomist.

It is a fact that endemico-epidemic diseases sometimes display strong contagious properties, whilst their diffusibility is comparatively weak with reference to the extent of country they occupy. It may be found that the converse of this holds good. At all events we may hope that the Asiatic cholera, like other great pestilences, will in time relinquish its present cosmopolitan habits. We know full well that plague periodically visited England, at intervals varying from forty to fifty years, between A.D. 430 and 1665; on which occasion, which happily proved the final one of its recurrence, it destroyed in London, in one week, no less than 8000 persons, although two-thirds of the population had previously fled from that city. I conceive that event to have been an unparalleled example of those fatal calamities in the morbid history of our country which fortunately occur but seldom: yet with such melancholy vestiges of the past in retrospect, it would be inconsistent and irrational to imagine that the future is destined to a complete exemption from physical dangers of equal magnitude.

England, it is true, has escaped the great epidemic plague since the time above specified, but it may not be uninteresting to some of my readers to know, that a few talented physicians of modern times, and foremost in their number, Dr. Armstrong, have regarded the worst form of typhus fever, as an endemic modification of plague. “In the more severe cases,”

says Dr. Armstrong, "I have not only seen a distinct bubo; but there have been carbuncles on different parts of the body. I have seen," he adds, "many such cases in the London Fever Hospital, and many in private practice." In a following passage, he tersely observes—"A friend of mine from the Pest House, at Constantinople, came to the London Fever Hospital; I took him to the bedside of a patient labouring under typhus fever, and said, What do you call this case? He replied, Plague!"

Other parts of Europe have notoriously suffered from epidemic visitations of the plague, at a recent period; for instance, Moscow had an infliction from it in 1771 and 1772. It visited Malta in 1813; it appeared at Venice in 1818, and as far north as Silesia in 1819. The most fatal and universal prevalence of plague in modern times, is that which took place at Marseilles in 1720-21; for out of a population of 90,000, there were but 10,000 that escaped its attack, whilst 40,000 corpses were the awful proofs of its malignity. Although this disease was formerly, like cholera, much more extensively epidemic than it is at present, yet at certain seasons it still breaks out in Egypt, more especially during the decline of the inundations of the river Nile. Now we can readily conceive how, under the influence of a hot sun, and the noxious effluvia generated by rapidly decaying animal and vegetable substances, an atmospheric condition is produced highly favourable to the renewed germination of the disease. It was under precisely similar circumstances that cholera took its rise in Hindostan.

All the monster epidemics, of which cholera is one, appear to have had their precursory signs; and amongst the heralds of these great human catastrophes, we may enumerate irregularities of seasons, violent storms, and extraordinary electrical commotions in the elements—earthquakes—blights in the vegetable kingdom—lesser diseases amongst mankind,

and by simultaneous distempers in the brute creation. Lord Bacon says, "those years have been noted for pestilential" "wherein there were great numbers of frogs, flies, locusts," &c. It has been observed at such times, that the insect tribes have been wonderfully called into life. The history of Asiatic cholera teaches us that it has not proved an exception to the general rule, but has had its premonitory events as clearly developed as those of any other great pestilence. As fevers of minor importance have been found to precede other great epidemics at short intervals, so it will occur to the memory of many persons, that a universal catarrhal fever (influenza) announced the approach of the malignant cholera to this country in 1831; and likewise, that on the decline of the latter disease in 1833, another epidemic catarrh immediately followed in its track. In the foregoing contingencies, the Asiatic cholera has displayed an accordance with the circumstances of the epidemic plague, as it breaks out from time to time in the land of Egypt, where the latter is often preceded by some kind of eruptive fever, and not unfrequently by the small-pox. Influenza has on many occasions been the forerunner of plague in various parts of Europe, Asia, and Africa, as well as of malignant yellow fever, more especially in the locality where the latter epidemic shows its greatest virulence—viz., at New Orleans, in the Western Hemisphere.

The rise and progress of cholera have, in many places, been marked by inundations: this was particularly the case prior to its appearance in the Delta of the Ganges, in 1817, which district, for several months, resembled a vast lake. The flood gradually subsided, when, by the action of a vertical sun upon a vast swamp, overspread with animal and vegetable exuviae in the greatest profusion, the germs of this modern scourge seem to have been vivified and endowed with powers of migration, only equalled by those of the

human race itself. The courses of rivers, often *not navigable*, have been in all latitudes the favourite haunts of this epidemic. This fact harmonizes well with its origin from a swampy district, and leads us to the conclusion that a humid atmosphere is a good conductor of the disease.

Dense mists were observed to prevail in many localities where the mortality proved the greatest; and these mists have sometimes been extremely offensive to the smell: such a circumstance, according to the official authority of Dr. Hamett, occurred at Dantzic, the environs of which town had been inundated previously to the outbreak of cholera there, in 1830.

Taking the oriental plague as our standard of epidemic observation, we have sufficient proof that some sort of fever goes before it on all occasions, sometimes even simulating the pestilence itself. It has likewise been observed that, during the reign of a tyrant epidemic, other complaints of the zymotic class for the most part vanish. Sauvages records the interesting fact, "that whilst the plague was raging in the South of France, in 1720, no greater number of persons died of the disease in the town of Alet—and none died of any other disease during the year of its visitation—than used to be carried off by other diseases, though the plague absorbed all others, or, in fact, put them to flight while it was prevailing." From Dr. Hennen we learn that, "for four or five years before the plague appeared at Malta, sudden deaths were more frequent than ordinary, and during the twelve months preceeding that in which the plague raged, and during the twelve months *immediately* preceeding, and especially for the last month of the period, the increase was still more remarkable, insomuch as greatly to excite public observation." These facts serve to show that the atmosphere does not attain the height of its deterioration at once, but that the transition from a healthy to a

pestilential constitution of the air is gradual, that it thus attains a certain morbid crisis, then as gradually declines until it reaches the level of health, only to be disturbed sooner or later by some fresh adulteration.

The frequent occurrence of sudden death from apoplexy has shown itself in former times as a forerunner of pestilence in many populous cities—for instance, in London, Marseilles, Aleppo, &c.; and even during the present month, November, 1847, it is reported on undoubted authority, that such events are common in Marseilles, Paris, and London, at all of which places the influenza is raging, and is unusually fatal. We can hardly doubt that such signs portend the infliction of a more malignant calamity.

Hecker informs us that the influenza of 1510 was followed by plague in the north of Europe; that the influenza which raged in Holland in 1557 proved the harbinger of a carbuncular plague, which lasted the following year, and carried off 5000 of the inhabitants of Delft. The minor epidemic again appeared in 1580, and a malignant pestilence followed immediately after, which desolated the greater portion of Europe; during its stay, forty thousand persons died in Paris alone.

We are told that in ancient times the augurs, or wise men, judged of approaching events by the flights and movements of birds; and also that they derived their prognostics from an inspection of the digestive organs of the lower animals. Whilst some attribute the pretensions to foreknowledge attained by such means to a fraudulent system of superstitious practices, designed with the intent to impose on the vulgar and the ignorant, others may view in them a keen exercise of the powers of observation, the results of which may have corresponded with those which in modern days constitute some of the most interesting facts of pathological science, especially in relation to epidemic diseases. It was

noticed at Dantzic, and several other places ravaged by the cholera, that the summer of 1830 proved very unfavourable to vegetation and to the health of cattle. "The majority of the population, especially the peasantry, suffered from complicated diseases. It was likewise observed, and reported to the faculty of medicine at Vienna, that during the existence of epidemic cholera in Lower Austria, Moravia, Gallicia, and Bohemia, that sparrows, crows, and singing birds appeared very rarely. Fish were observed to be affected, particularly in those places where the cholera raged with the greatest virulence, and where there were great inundations. Even the symptoms of the disease, and the pathological changes observed upon examining the animals after death, exhibited a striking similarity to those produced by the human cholera." The same report states that fish, crabs, and leeches, died in great numbers at the time of what is therein termed the cholera "*pandemic*." "Dogs and cats frequently died under appearances of cholera, and hares particularly, among wild animals; but birds seemed to suffer most," and their disease was observed to bear a great likeness to cholera as it occurred amongst mankind.

It is related by Hecker that in the "great mortality," or "black death," of the fourteenth, fifteenth, and sixteenth centuries, plants, birds, and other animals perished during the pestilence, but that the insect tribes were marvellously increased.

It has been observed that pestilential diseases in the human race, and the other animal tribes, have been attended with antecedent or concomitant blights or diseases in the vegetable creation. Perhaps more minute researches on this subject would elucidate a constancy in the order of recurrence of these events, which might explain the relation which subsists between famine and pestilence. Dr. M'Lean,

an eminent authority in malignant fevers, says that during the epidemic malignant fever at Cadiz, in 1764, a great deal of old and corrupted corn was consumed, and that the disease was most violent amongst the poor. In that year the lower animals were the first affected, and the mortality was observed amongst birds fed on grain, as pigeons, poultry, &c.; from which circumstances we may very consistently infer that the agricultural produce had been injured in its wholesome qualities by the insalubrious state of the atmosphere. We are familiar with the fact, that corn and many other cultivated plants are attacked by diseases which demonstrably depend upon the ravages of insects; for example, the bean crop of the present year, and the potato for several years past, have been devastated by a pestilence evidently depending upon animalculæ, the origin of which is altogether unaccountable. The effect of the disease in the potato has some analogy to the moist gangrene, as it takes place in the human body.

Mr. A. Alison informs us "that an acre of potatoes will annually yield food sufficient for ten persons:" he further tells us, according to the calculations of Mr. Young, "that an acre of wheat yields, on an average, only one-third of the solid nourishment which is derived from one of potatoes." From this prolific property, and from the ease with which it is cultivated, the potato crop has unhappily become the staple food of Ireland. We can, therefore, readily appreciate the importance of the integrity of this esculent to the physical welfare of the Irish people. I think it by no means improbable, that the malignant fever which for some time past has prevailed in Ireland may have been aggravated and fostered as much by the vitiated qualities of the national food, as it was by the scarcity arising from the general failure in the quantity of produce. Be that as it may, typhus has proved singularly virulent in Ireland during the last two

seasons, having been frequently attended with black spots, glandular enlargements, boils, gangrene, &c.

Dr. Haneoek observes that the Romans were wont to attribute epidemic diseases in general to a corrosive mildew, and even instituted 'festa rubigalia' with the superstitious intention of depreeating its effects. Hoffman, a German physician, mentions a mildew as having infected vegetables in 1693 and 1694, whence the cattle died in multitudes. It is not to be supposed that tainted food does of itself generate a peculiar epidemic; a combination of other causes seems to be required for that end. We may, however, rationally presume that the special instruments of pestilence obtain auxiliaries from the sources here referred to, the effect of which is to predispose persons for the reception of the morbid influence. Amongst many other facts, which testify to the prejudicial effects of vitiated aliment, and its power of creating a liability to pestilential impressions, I shall adduce one related by Dr. Haneoek from the "Loimologia" of Dr. Hodges, who was indefatigable in his attendance upon those who suffered from the great plague, when that disease prevailed in London, in 1665. He states, "that many knowing
 " persons ascribed the pestilence to the quantity of bad meat,
 " from the preceeding sickness amongst cattle, which was
 " sold so cheap to the poor, that they fed upon it to gluttony.
 " It is incredible to think how it raged among them, to such
 " a degree that it was called the 'poor's plague.'" No one can doubt that malignant cholera is equally well deserving of the latter designation, or that we have just grounds for the belief that the evil may be seriously increased by the use of tainted and unwholesome food.

The interesting and accurate researches of Liebig, Boussingault and others have shown that the aliment is the fuel which sustains the animal temperature at its mean height. If we reflect, then, that cholera is a disease, the special

attribute of which is, above all others, and from the first, to extinguish the vital heat, we must be convinced that a liberal use of sound food is a matter of leading import during the prevalence of this epidemic; in short, that an unfailing supply of good nutriment is both a rational and practical means of prevention of the very highest value.

In a former part of this discourse, I have made the remark, that Asiatic cholera fixes upon the principal abdominal organs as the leading objects of its attack. I have likewise given it as my opinion, that the disturbances which are therein occasioned depend upon a previously envenomed state of the blood.

It is matter of notoriety that as the various regions of the body have epidemic diseases peculiar to them, and where the morbid lesions are most obvious; so there are certain climates which are more conducive to the existence of one kind than they are to another. Whilst diseases of the thoracic organs abound in northern latitudes, those of the abdomen are more indigenous, rife, and critical in those countries that lie nearer to, or within the tropics. The influenza, however, which may be regarded as the prototype of the former class, and the cholera, which may be considered as the great symbol of the latter, both appear to have been exceptions to the general rule; the former having broke out in India, and swept over both hemispheres, from the equator nearly to the pole, about the same period when the epidemic cholera marched through Asia,—thence pursuing a north-westerly direction, proceeded across the plains of Europe, and arrived in England in the year 1831. From the British islands the disease radiated in two widely diverging courses; the one conducted it across the Atlantic to the western continent; the other carried it through France, Spain, and Italy, to Northern Africa. Throughout this extensive tour the influenza advanced as the pioneer of the epidemic cholera.

The same series of phenomena have taken place during the year 1847, and as far as the cholera has hitherto extended, it has been invariably preceded by an epidemic eatarrh. The eccentric habits of these epidemics, and their allied movements are conspicuous enough, since they show an utter independence of season or climate;—whether in spring, summer, autumn, or winter, the cry is “still they come.” A certain amount of analogy may be said to subsist between these two epidemics, inasmuch that in both of them the mucous membranes are the structures in which their morbid action is developed, and the character of both, in their separate spheres of operation, is to produce defluxions of an exhausting nature from the blood.

An eminent writer on the subject tells us “that strong purgatives are generally objected to in cases of epidemic influenza, on account of the tendeney to a morbid state of the mucous coat of the bowels usually accompanying the complaint.”

I think it not unlikely that the repeated visitations of epidemic eatarrh, during the last and present centuries, have tended to impair the constitutional powers, particularly in relation to the circulation of the blood, in the inhabitants of our northern climates, thereby rendering them especially intolerant of the loss of blood, and, at the same time, have increased the general liability to dyspeptic and other chronic disorders of the mucous membranes. It is notorious, amongst practical men in the profession, that, in the present treatment of disease, bloodletting is seldom required, and seldom borne with impunity.

History informs us that, towards the close of the fifteenth century, a great epidemic pestilence, of as novel a kind as the cholera, broke out in this country, and subsequently spread over the whole of Europe. There were altogether five visitations of that scourge; the first took place in 1485,

the last in 1551. According to Hecker, its several invasions were accompanied by "thick and stinking mists;" he adds, from the authority of Dr. Kaye, who was at the time principal physician to Queen Mary, that "these mists were observed " moving from place to place with the disease in their train, " affecting one town after another, and morning and evening " spreading their nauseating and insufferable stench around." This pestilence was known by the name of the "English sweating sickness:" it so far resembled the influenza and cholera, that it was characterized by copious defluxions, not, it is true, from the mucous membranes, but from the skin, whence "an immoderate excretion of watery fluid took place" with "a consecutive state of inanition" or exhaustion, and this often passed into a complete "*stagnation of the circulation.*" We cannot fail to recognise in this description a certain relation to the effects and symptoms of Asiatic cholera. The disease was supposed to be a malignant form of rheumatic fever, as it was attended with excruciating pains in the limbs and joints.

In the family of pestilential diseases, the 'sweating sickness' of the middle ages is entitled to take, perhaps, a higher rank than the epidemic cholera of the present age, being quite equal to it in the severity of its symptoms, and the rapidity of its course, but superior to it in the great mortality which it occasioned, for no grade of society was exempt from its attacks. We are told by Hecker, "That the sixteenth century was an age of putrid, malignant affections, " in which typhous diseases were continually prevailing—a " century replete with grand phœnomena affecting human " life in general."

There would appear to be a relation between the greater disturbances in nature, and the rise and progress of the more malignant epidemics; in all likelihood, they stand towards each other as cause and effect. An explanation of

these mysterious agencies is out of our power. We can only form conjectures on the subject. As a general summary of the events referred to by Hecker, during the latter part of the fifteenth, and the whole of the sixteenth centuries, I may mention that violent hurricanes, earthquakes, and inundations were frequent. Summer fogs, attended with very noxious odours, prevailed, especially during the times of the "sweating sickness;" extensive destruction of cultivated crops by blights occurred; to these calamities succeeded famines. Birds were often attacked by fatal diseases, and murrain destroyed the flocks and herds in all directions. Of the diseases which affected the human race, I may enumerate, besides the "sweating sickness," epidemic scurvy, which spread all over Germany; plague, at longer or shorter intervals, throughout Europe; petechial or spotted fever; and the syphilitic pestilence, which originated, it is affirmed, at Naples, in 1495, amongst the French invading army. It is worthy of remark, that Henry the Eighth frequently changed the residence of his court in consequence of the "sweating sickness" and the "plague."

During that period, we learn that all morbid states of the organism showed a determination to the skin.

It must be admitted that many of the natural events which I have recounted, have had their parallels in the present century. I think we may gather, from a deliberate consideration of all these various circumstances, that epidemic diseases are subject to systematic laws; and although to our imperfect perceptions they may seem accidental, I believe their courses are as strictly prescribed, and as uniform in their recurrence, as are the appointed order of things in the astronomical world, or the succession of seasons on our globe.

The most authentic records agree that Asia has ever been the cradle in which epidemics have been nurtured; hence

it would appear that the soil which gave the earliest sustenance to the human race, has, at a later period, furnished forth the most powerful causes of its dissolution.

If a comparison were instituted between the depopulating powers of war and pestilence, I believe the mortality arising from the latter source would be found, at every period of the world's history, greatly to exceed the destruction occasioned by the former. In the political history of nations, by the most celebrated authors, the fatal force of epidemic diseases in lessening redundancy of population has seldom been fully accredited or insisted upon; whilst, on the other hand, an undue preponderance has been awarded to the operations of barbarian or foreign invasion, simply with respect to the extermination of human life by the sword. Collateral events of a morbid nature have, for the most part, remained unnoticed by the historian, or have been slurred over by a few cursory remarks. A proper and comprehensive estimate of the agency here referred to might dictate the belief that pestilence has been prescribed as an important constituent in the government of human affairs, whereby the increase of mankind is kept down to the existing level of intellectual advancement, as well as of productive industry and improvement. We learn from Gibbon, "That by the incursions of
" the Goths and Huns, between the third and fifth cen-
" turies, the greater part of the population of Northern Italy
" was destroyed." According to Procopius, "In the wars
" of Belisarius, in Africa, five millions are computed to have
" perished; and during the subsequent contests between
" that warrior and the barbarian armies of Italy, the whole
" Gothic nation, and nearly fifteen millions of the natives of
" Italy disappeared."

Mr. A. Alison briefly remarks, that, "the plague, which
" attended and followed these sanguinary contests, *carried*
" *off* still greater numbers than the sword; and that during the

“ fifty-two years that it desolated the Roman Empire, it is said to have destroyed *one hundred millions of inhabitants.*”

The same talented author further adds, “ The plains of Lombardy returned into a state of nature, and were covered with forests, inhabited by wild beasts, as in the first ages of the Roman Republic.” Such a condition is precisely that in which malaria and pestilential epidemics would gain the ascendancy, being wholly unrestrained by those great instruments of atmospheric purification,—viz., tillage and agriculture.

The enormous mortality which in more recent times has been referred to bloodshed, might perhaps with greater truth be imputed to the breath of pestilence. In the “ Black Death,” or, as it was otherwise termed, the “ Great Mortality,” which desolated Europe, Asia, and Africa, during the latter moiety of the fourteenth century, it has been calculated, from the most authentic chronicles, that in Europe alone, out of a population of 105,000,000 of persons, 25,000,000, or nearly one-fourth of the whole, perished from that disease. The depopulation, which proverbially occurs from time to time in oriental and southern cities, I believe to be the result of an uncontrolled succession of pestilential maladies, and entertaining as I do that opinion on the subject, I cannot but regard the Asiatic cholera, the great master pestilence of the present century, with respect to the mortality which accrues from it, as a comparatively lenient visitation. In all probability this truly hideous disease issued from its birthplace in the East, invested with powers of attack equal to any of its predecessors, and far surpassed most of them in the malignity of its nature; but we may congratulate ourselves that the arts of peace and civilization, with the resources of science, have furnished us with means of protection, which have proved effectual in proportion to the extent of their practical application. Both in a physical and moral sense

our destinies have improved ; and amidst numberless counter-acting forces still existing, still unbent to the purposes of happiness and immunity from suffering, we may point with hope and exultation to the triumphant fact, that every year, according to the tables of British Assurance Companies, a gradual increase is, in this country at least, taking place in the value of human life, and a larger average proportion die of those diseases of decay which advanced age entails.

Nevertheless, I am of opinion that epidemic disease constitutes an essential element in the designs of Providence for the management and control of sublunary affairs ; and if, to quote the expressive language of Dr. George Gregory, “ we may venture so far into the regions of conjecture, as to predict that nature has not yet exhausted her catalogue of epidemic

“ ‘ And wide wasting pestilences,’

“ there are probably others ‘ of the painful family of death,’
 “ still in the womb of time, to occupy the thoughts of physicians yet unborn, and to assume hereafter their station
 “ amongst

“ ‘ The miseries which the inabstinence of Eve

“ ‘ Hath brought on man.’ ”

Civilization, though incomplete, has advanced, and is still advancing in the right direction. The course and sum of human life can never attain to the goal of physical perfection, unless the intelligence and ingenuity of mankind are directed to the invention and fulfilment of sanitary measures on a comprehensive scale ; for without the employment of these means, we can never hope to render the fabric of society impregnable to the assaults of pestilential diseases.

It will be obvious to those who are intrinsically well acquainted with the principles of the subject, that no public system of sanitary regulations can be complete, unless it is

founded on the basis of THOROUGH DRAINAGE, as well of towns, as of all swampy and heavy soils and districts, wherever situated. Any scheme for the benefit of the public health, which insists upon this as a preliminary condition of the undertaking, will at once administer to that object, and to the perfect prosperity of agriculture. We cannot deny that vast improvements have taken place during the present century in these respects; but unfortunately they are only of partial application; where, however, they have been most effectually attended to, they have materially mitigated the prevalence and severity of epidemic diseases. The custom of deep drainage in close and heavy lands is now frequently adopted,—and its value is generally, if not universally, admitted as the first step towards perfect fertility. The connexion between agricultural improvement and hygiène, appears to me so intimate and inseparable, that I have naturally been drawn into a conjoint consideration of those subjects in their relation to each other.

I fear we have but small inducement to hope that any *perfect* measure of sanitary reform will be carried out in the present generation. A vast amount of indolence, ignorance, and prejudice, has yet to be overcome in various quarters, ere capital and industry are directed, with zeal and enterprise, into such permanently salutary and prosperous channels.

I think it hardly possible fully to appreciate the advantages that would result to society from a cultivation of the length and breadth of the land, founded on a system of deep drainage,—where the nature of the soil requires it in the rural districts; and by an effectual purification of all our towns and villages, by an application of similar expedients to them, organized and arranged with a view to render the refuse, incidental to congregated masses of human beings, a source and means of agricultural fertility, rather than, as it is at the present time, the frequent hotbed of innumerable

endemic and pestilential diseases. These are the real instruments of quarantine, by which we can alone hope to conquer or restrain the painful force and frequency of virulent epidemic and other diseases through all the ramifications of society. We shall not, as some may imagine, have reason to fear any undue increase of population,—for with it (but in a much larger proportion) will augment and multiply the general means of subsistence.

Were it in our power to banish epidemic diseases from our dwellings, as well as all other causes of *premature* human dissolution, still the powers of vegetable production seem capable of meeting the highest probable amount of population. Mr. A. Alison, in his able work upon this subject, says, “It seems, in every point of view, abundantly clear
 “that the true relation between population and subsistence
 “is that of cause and effect; that the labour of man’s hands
 “is by the eternal law of nature adequate to much more
 “than his own support; that this superiority of the powers
 “of production over those of population is a fundamental
 “law of his existence, which never fails him in any period
 “of his progress; and that so far from this superiority becoming less in the later stages of society, it is constantly
 “becoming greater, and that it is owing to that excess that the
 “accumulation of wealth, arts, commerce, and manufactures
 “owe their existence. If these principles be well founded,
 “it must be at once apparent that all apprehensions of the
 “increase of population beyond the means of subsistence
 “which the soil affords, are entirely chimerical in any particular country, until its cultivation is approaching the
 “extreme limit of perfection, and equally visionary with
 “reference to the whole world, until the globe itself is all
 “cultivated to the utmost.”

I do not believe that any country has, in the history of the whole world, ever gone beyond mediocrity in its agriculture;

but I am persuaded, where the arts of husbandry have been practised and improved to the greatest extent, that epidemic distempers, both in man and other animals, have been greatly mitigated. It has been observed, on the other hand, wherever lands, especially in level and damp countries, are thrown out of cultivation, and those who have followed agricultural occupations are driven to seek refuge in towns, that epidemic and endemic diseases revive and rage with renewed virulence. Such a contingency can scarcely occur within reach of our own observation: an instance of the kind, however, arose at the time of the Protestant Reformation in England, and history informs us, owing to the arable lands being laid down in pasturage, in consequence of the abolition of monasteries, and the almost entire suppression of agriculture during the reign of Henry the Eighth, that pestilential diseases became wonderfully prevalent in England, and ruinously fatal. At that time the rural population fled to the towns, where a vast concourse of human beings was thus suddenly assembled under the most inauspicious circumstances; for, if drainage was neglected in the country districts, sewerage was utterly unknown in towns, which were on that account peculiarly unfitted for the reception of any great influx of inhabitants; hence, in the words of Horace,

“ Nova februm
“ Terris incubuit, cohors.”

The mere superficial cultivation of the soil, without deep drainage, wherever it is required by the naturally impervious quality of the land, can improve the healthiness of the atmosphere only in a limited degree. The observation has been made by a practical writer on the subject, that in clearing and cultivating a new country, although the climate is eventually improved, it is too well known, and has been too dearly learned, that the first effect is insalubrious. We

may rationally infer that these ill effects would not happen to anything like the same extent, if *thorough drainage* could be made on all occasions the preliminary step in these undertakings. The question is one of colonization, and has therefore great practical interest.

Malaria may arise at once from putrid deposits, or else from morasses and undrained marsh lands, by the more gradual decomposition of animal and vegetable substances, when these are submitted to the joint action of heat and stagnant moisture. The importance of striking at the root of these evils, by a general system of sewerage and drainage, must be abundantly obvious. The history of mankind shows that, however far civilization may have advanced in other directions, and however successful may have been the efforts for national aggrandizement and mercantile prosperity, human enterprise has never yet essayed a perfect conquest of the soil, pregnant though it is with such incalculable and lasting benefits both to nations and individuals.

There is no country, however favoured by natural advantages of climate, soil, and situation, but would find its population eventually decline, if sanitary regulations, and the arts of culture, were entirely withdrawn from it. This spontaneous depopulation notoriously happens in the cities, towns, and villages of the East, especially in Mahommedan states. Both in Persia and Turkey, where the voluntary riches of nature are found in their greatest variety and luxuriance, we are told that the human race is continually decreasing.

We are informed by Mr. A. Alison, that a “singular law
“exists in China, to which it is difficult to find a counterpart
“in any European state, though it had a well-known parallel
“in the Jewish institutions—viz., that all lands which are
“not regularly cultivated are forfeited to the king, who
“grants them to new and more industrious tenants.” The

population of China has been computed by Sir George Staunton at 300 to the square mile, which is considerably more than that of the British Islands, where waste and undrained lands exist in such boundless profusion.

Mr. Alison tells us, from the authority of Walsh, Clarke, and Heber, that over the whole Ottoman empire, and in various parts of India, the hilly regions are more populous than the plains. This eminent writer ascribes this result to political and moral causes; but I should rather impute it to the less necessity there is for artificial drainage in those elevated and rocky countries, and the comparative immunity of the inhabitants from malaria and the ravages of pestilence.

No measure of sanitary improvement will be complete that does not render the abolition of burial places from the heart of large populations one of its primary conditions. I might encumber this "discourse" with an endless account of the disastrous and fatal effects which have ensued from the opening of graves in densely crowded churchyards. I shall content myself by referring the reader to a publication of Mr. Walker's, entitled, "Gatherings from Graveyards," for numerous lamentable details on this subject. It appears that sudden deaths, and fevers of a most malignant and fatal kind, have frequently arisen from this source. If these are the palpable effects of the free vent which is occasionally given to the noxious effluvia, there are equally good grounds to suppose that a stream of putrid emanations, of a less concentrated, but not of a less poisonous nature, constantly flows from the surface of these hotbeds of corruption into the surrounding atmosphere; and that the health of the inhabitants is kept below par, and their lives in continual jeopardy. London, with respect to its geological topography, stands upon a deep bed of strong clay, through which no natural percolation can possibly take place; hence those matters which result from decay and putrefaction are retained near

the surface, and it must be clear that a locality so circumstanced is peculiarly unfitted to become the depôt for human interment. Our cemeteries or burial-places should be at a distance from our dwellings; and those situations should be uniformly selected which are characterized by dryness, and have the greatest depth of porous subsoil—gravel, chalk, or sand, should, for the reasons already explained, invariably have the preference.

Having thus far glanced at the probable consequences of the general institution of sanitary laws, and advancement in agriculture, as a counterpoise to the virulence and mortality of epidemic diseases, and of cholera amongst the rest, I propose now to consider briefly the relative liability to, and mortality from the latter disease in populous towns, and in country districts. Statistical inquiry has shown that the mortality has been the greatest in the largest towns, and particularly in those where the streets are narrow, the drainage and sewerage neglected, and the habits of the people the most dissipated and filthy. It appears that in such situations, and under such circumstances, the pestilential aura finds the most suitable material with which to amalgamate.

In Moscow, Paris, and Marseilles, all of which labour under the foregoing disadvantages, cases of cholera were unusually numerous and fatal. A memorial, drawn up and signed by the great body of medical practitioners in Leeds, states that the malignant cholera, when it visited that town, prevailed in the most confined and dirty quarters. This was the case also in Sunderland, Manchester, Liverpool, Edinburgh, &c. It was observed that those streets which were situated on the borders of canals or rivers were chiefly affected.

Dr. Suerman, in his medico-statistical account of the epidemic cholera in the years 1832 and 1833, says that, in Holland, the disease, out of a population of 2,427,206, at-

tacked 19,037 in both the epidemics of 1832 and 1833. In the former year, the proportion of cases of the disease to the whole population was, in RURAL DISTRICTS, 1·54 per 1000, whereas, in TOWNS, it was as great as 8·93 in the 1000. In the latter year, the proportions were 1·08 and 7·42, giving an average in both epidemics of 8·17 per 1000 for TOWNS, and 1·31 per 1000 for the country. Dr. Marcus informs us, that the proportion of cholera patients during the epidemic at Moscow, in 1831 and 1832, was as high as one in thirty-two of the whole population—that the total number of cases treated there was 8609, of whom 4695 died, being above one half. Such a proportionate mortality has in modern times had no other parallel than that which attends the occasional visitations in some countries of the Egyptian plague.

Although some have pretended that the Asiatic cholera, during its present expedition in Europe, has evinced a milder type, and less fatal character, the most authentic reports which have appeared in the course of the present month, (December, 1847,) by no means tend to confirm such a belief. From these reports we learn, that in the government of Saratov, the number of cases has been 18,594, out of which 9194, or nearly one half, were fatal. In the town of Orel, out of 1715 affected by the pestilence, 830 died. A similar proportion of cases and deaths have taken place at Moscow. I shall conclude this part of the subject by stating that Dr. Suernan's facts, above detailed, coincide with the general rule of mortality from pestilential and other morbid causes, both in this country and other parts of the world. Mr. A. Alison, to whose writings, on account of their accuracy, I can refer with the utmost confidence, says, "The difference between the rate of mortality in large, and still more, in great manufacturing towns, and rural districts or villages, is always considerable, often so great as to be attended with the most important effects."

It is not my intention in this "discourse" to speculate at any length upon the precise mode by which the aura of the epidemic cholera obtains its existence, or how it unites with and traverses the atmosphere: our data are too obscure to admit of anything more than negative reasoning on this topic. Whatever arguments may be adduced to elucidate the true nature of the impregnation which gives rise to this formidable disease, will apply to epidemic distempers in general. In the first place, our knowledge of meteorology is far from being upon a par with other branches of science, so that our investigations are attended with the greatest difficulty in the very threshold. Now, it has been observed that cholera seems often to travel against the wind, and even in the face of the most violent monsoons, from which a hasty conclusion has been drawn by some that the air cannot be the vehicle of its transmission from one country or place to another. Such an argument is of easy refutation, inasmuch that, although the currents of air at the earth's surface may pursue a direction opposed to that taken by the epidemic, yet we know that, at a loftier elevation, the atmospheric movements are reversed. It is therefore neither improbable nor inconsistent to presume that, under certain electrical interchanges between the earth and atmosphere, the epidemic aura may sometimes be carried into a higher stratum, and thus pursue its appointed course without interruption, until—the general equilibrium being restored in the elements—the disease may alight on those localities which have hitherto been found its most select points of attraction.

Many attempts have been made to define the nature of the materials which generate the several kinds of epidemic diseases, but as far as demonstration goes, they have hitherto proved utterly fruitless. Of one negative fact of considerable interest we are certain—viz., that they have defied the art of chemical analysis. I must candidly avow, that after weigh-

ing the relative probabilities as to the truth of the different theories upon the subject, I am inclined to favour the somewhat obsolete doctrine which teaches that such visitations are due to animaleular sources. These germs are too subtle for us to penetrate the mysteries of their existence, even with the highest microscopical aid; we cannot, therefore, bring demonstrative evidence in proof of this supposition, neither can we of any other; still the probable testimony in its favour is stronger, to my mind, than that of any other means yet offered in explanation of the very extraordinary phenomena of epidemic cholera. Nothing can be clearer than that the diseases of the vegetable tribes depend often upon animaleular visitations, apparently of atmospheric origin; we know besides that the brute creation, as well as the human race, are liable to be infested, both internally and externally, with entozoa or parasitic insects, the origin of which is altogether inscrutable, for many of them are never seen under any other circumstances; we know, moreover, that during animal decompositions, new forms of life are repeatedly presented to the view; lastly, the researches of the geologist have proved, that to the constructive powers of myriads upon myriads of infinitely minute animated beings, are owing the formation of many parts of the habitable earth. If we take into account the conditions under which the epidemic cholera was begotten in 1817, we find that it arose from a vast swamp adjacent to the embouchure of one of the largest rivers in the world; that this swamp was the result of an extraordinary inundation, during the drying process of which, under the influence of intense solar heat, vast multitudes of insects were, no doubt, drawn forth from the embryo state and vivified, in consequence of the enormous amount and variety of decomposition of animal and vegetable remains which took place at that period.

Some persons, on the other hand, may be more disposed to

ascribe this terrible pestilence to certain gaseous products of a peculiarly poisonous nature. I am not aware, however, that gas has the property of multiplying itself; this property belongs, as we well know, to many of the insect tribes in a very marvellous degree. As far as I can judge, we are compelled to adopt one or other of these views—either that the pestilential contamination of the air depends upon a specifically poisonous gas superadded to the atmosphere, but the existence of which the most expert chemists have been unable to ascertain; otherwise, upon animalculæ equally venomous, and, according to our present experience, too diminutive for detection. It has been ably argued by Dr. George Fife, that in our inquiries for the specific agent by which cholera is produced, we are not to look for any distinct miasm, but that it is rather to be traced to some undefined electrical development, which, in susceptible individuals, inflicts a morbid shock upon the nerves of respiration, owing to which the oxygenation of the blood is arrested, and the powers of life are suddenly prostrated; nothing more or less, in fact, than a modification of the state of persons who have been struck by lightning. Dr. Fife insinuates, that in consequence of this, the bodies of those who have died of cholera run so rapidly into the state of decomposition. These views are, to say the least of them, ingenious; but I see no reason for supposing that cholera is an exception to the general rule which applies to the nature and origin of other epidemics. We are much better able to explain *all* the circumstances which attend the geographical distribution and symptoms of the Asiatic cholera, by referring its cause to some specific contamination. It may at the same time be admitted, that electricity contributes its share of influence towards the state which Dr. Russell, when speaking of the plague, terms the “pestilential constitution of the atmosphere.”

Assuming these principles to be correct, we must be contented for the present with the ultimate fact, which is sufficient for all practical purposes, that the air of infected districts is impregnated, in an unequal manner, with some noxious effluvia; but whether this is of an animalcular or gaseous kind, it is out of our power to determine: moreover, that, although this mysterious agent is in general impalpable to all the senses, it becomes, under certain circumstances, perceptible to that of smell. The hypothesis which regards a peculiar electrical development as the sole cause of the epidemic seems nugatory; but, as before observed, some such condition may be required to give the aura of the disease a due scope for activity. If electrical agency were the whole and sole cause of this pestilence, we could hardly expect that it would yield to the fumes of chlorine, or any other kind of gas, neither is it rational to suppose that it should be destroyed by a heat of 300° Fahr.

We may fairly presume that the epidemic poison (without some collateral sources of renovation or supply, unless it were endowed with some inherent attribute of self-augmentation) would become exhausted during so extensive an itinerary as the circumference of the globe. My opinion is, that it does derive sustenance and support during its action on the bodies of its victims, whereby the aura is not increased in intensity, but simply preserved at a level adequate to the fulfilment of its migratory destinies. As an indisputable proof that the ordinary poisonous gases—with the nature of which we are well acquainted—are not the instruments through whose means the morbid effects of cholera are induced, I may observe, that the accurate experiments of Mr. Herapath, who is allowed to be one of the most scientific and practical chemists of the day, have established the fact, that neither sulphuretted hydrogen, phosphuretted hydrogen, sulphuret of ammonia, or arseniuretted hydrogen, are con-

earned as constituents in the miasm of Asiatic cholera; and yet that gentleman alleges that a peculiar putrid smell is emitted from the air which he has subjected to chemical examination. He tells us, that a portion of the infected air passed through nitrate of silver only forms a red tint, which, if I understand the experiments correctly, cannot be well explained. From the same good authority we receive the information, that chlorine gas, at all temperatures, and also an atmospheric heat of 300° Fahr., possess the power of dissipating the morbid material. I do not believe that these valuable and available facts have hitherto been properly estimated, or applied as a general means of protection. A warm and southerly constitution of the atmosphere has been observed to attend the prevalence of epidemic fevers in general: the Asiatic cholera does not seem obedient to this law,—like a true citizen of the world, it finds a domicile in all latitudes, from the shores of the White Sea to those of the Indian Ocean. It would almost appear as if pestilential diseases were divided into castes, corresponding with the divisions of society into the upper and lower orders. Again, whilst one spends its fury upon the robust and those in the prime of life, another wages an unequal war with the youthful and the aged, the immature and decrepid portion of mankind: in illustration of this, Hecker states that the “sweating sickness” seized upon the most vigorous of every rank, and that, according to Ditmar, “*immunes erant pueri et senes ab hoc malo.*” The propensity of the Asiatic cholera, on the other hand, to choose for its prey the destitute and debilitated, is too well known to require any further comment. This latter rule, like every other, is not without its exceptions; and as one instance within my reach, I may mention, that when cholera was epidemic in Dublin, in the year 1834, it was equally frequent and fatal amongst the more opulent classes.

It is a fact not without interest, that in very large towns the cholera lingered as an epidemic for several successive seasons. In London, for example, during July, August, and September, in the year 1832, there were 2390 deaths from that disease; in 1833, there were 1233 deaths; whilst in 1834, the mortality from the same cause only amounted to 488.

The Asiatic cholera is admitted to be a disease incidental to all climates, at all seasons; but there is a considerable amount of testimony to show that the disease is more disposed to manifest itself at one particular period of the twenty-four hours, and that this is for the most part between midnight and sunrise. There are circumstances, both within and without the body, which may operate as causes of this liability as to the time of its attack. During sleep, we know that the discerning functions, or, in other words, the organs of waste, are in a comparatively inactive state, whilst the processes of absorption and assimilation are increased; hence it will be apparent how the zymotic matter of the epidemic has an opportunity the most favourable for the exercise of its baneful influence. The active operations of the great glandular structures, such as the liver and kidneys, (the organs especially implicated in this disease,) which are conducted with energy during the day time, either offer an effectual impediment to the morbid aggression, or furnish the means by which the system may shake off the grasp of its assailant. With the diminution of secretion which naturally occurs in the night time, there are likewise a diminution of animal heat, and a general torpidity of the brain and nervous system. However beautiful the design may be by which the periodic exhaustion and renovation of the vital powers are accomplished, it involves conditions which doubtlessly expose our frames to many dangers from without. During sleep, our economy, with reference to

malaria, is thrown into a more defenceless state than appertains to it during the hours of wakefulness. In warm latitudes, such as Italy, especially in those parts where malaria abounds, sleeping in the open air is always dangerous, and frequently fatal. Dr. M'Culloch says of Italy, with reference to this subject, "its fragrant breezes are "poison, the dews of its summer evenings are death."

All must be familiar with the fact, that we are more prone to feel chilly, with our ordinary amount of clothing, at all times during the state of sleep. If sleep, by arresting a due supply of animal heat, engenders cold, we know full well that exposure to extreme cold induces an irresistible inclination to sleep, which, alas ! has too often proved the "sleep of death." It is now pretty well established, by the experiments of physiologists, and by the able reasoning of Dr. C. B. Williams and others, that animal heat is a result of the ehemico-vital changes which take place in the principal glandular organs—such, for instance, as the kidneys and liver; these, it would appear, are more engorged with blood in the night time, and congestion is a state unfavourable to secretion. These truths are abundantly illustrated by the hybernating slumbers of certain animals, which have the power of preserving life for months without food, owing to the organs of waste being thrown into a passive state; but this could by no possibility happen, unless a continuance of life had been made in them independent of the usual evolution of heat, as it occurs in other warm-blooded animals.

With a sensible decline during sleep in the faculty of generating heat, we have also a decrease in the formation of saliva, bile, urine, &c. ; whilst nutrition, which implies the passage of fresh materials into the blood, is carried on with peculiar diligence and energy.

By taking these physiological points into consideration, we can have no difficulty in comprehending how, in the first

instance, the poison of cholera acts on the organism—viz., by vitiating those affinities by which healthy nutrition and assimilation are regulated, and by the subsistence of which the nervous or vital energy is periodically renovated.

The phenomena of the disease quite harmonize with these views, for with the ruin of the assimilating and nutrient powers (common to other forms of fever, as heetic, typhus, &c.), the physician also recognises in cholera a total cessation of the proper functions of secretion. Amidst the organic stillness, life only seems to linger by a slight tenure on the brain and nervous system. I have already alluded to the discovery of Mr. Herapath, that the miasm of cholera is rendered inert by a heat of 300° Fahr. As a commentary upon this, and nearly allied to it in principle, is the observation of the late Sir Gilbert Blane, to the effect, that plague seldom or never co-exists with an atmospheric temperature above 80° Fahr., nor much below 60° Fahr. From the history of the plague in England, it appears that “it never began to “rage epidemically until the end of June or beginning of July; “that it reached its acme in September, then declined, and “entirely subsided in winter.” I am not aware that a high degree of heat has in this country ever been designedly employed to dissipate the malaria of pestilential disease. The monument of London is, however, a lasting memorial of an accidental application of this great antidote of pestilence on a large scale. It is a somewhat singular fact, that since the great fire of London in 1666, plague has never reappeared as an epidemic in that metropolis; and not even sporadically, unless, with Dr. Armstrong, we regard certain cases, which are usually denominated malignant typhus fever, as a subdued and endemic form of that disease.

Even the temporary and occasional diffusion of artificial heat in our dwellings, equal to the degree mentioned by Mr. Herapath, as necessary to destroy the miasm of cholera,

would be scarcely practicable ; and if it could be accomplished without difficulty, other dangers would ensue from its employment. Nevertheless, air more moderately heated by means of properly constructed stoves judiciously placed, may be made to circulate through our habitations with signal advantage during the epidemic period. On the same principle, our grates should be liberally supplied with fuel during a corrupt and damp constitution of the air. By artificial heat thus maintained we secure the dryness of our domestic apartments, and effectually prevent those moist stagnations of the atmosphere, which experience has proved to favour the aggressions both of cholera and influenza.

The disposition of cholera to manifest itself by a nocturnal assault may, in some measure, be connected with the general extinction of fires in the night-time. In the houses of the affluent, or those even in tolerably easy circumstances, the temporary withdrawal of these artificial sources of protection may be comparatively unimportant, their place being supplied by the enjoyment of other muniments of health—viz., good diet, cleanliness, and warm clothing. It must be conceded, however, that in the abodes of wretchedness and want, the removal of artificial warmth proves the departure of the only safeguard against the humid and noxious effluvia by which they are too often environed ; their inhabitants then fall an easy prey to any prevailing distemper. The late Sir George Le Fevre, who was physician to the British embassy at St. Petersburg, says, that colds and influenza are almost unknown amongst the upper classes in that metropolis ; and he ascribes this immunity principally to the comfortable and equable temperature which is maintained in the dwelling-houses.

None can deny that there exists abundant food for pestilence in the great towns and cities, both at home and abroad. We are told by M. Dupin, that “ in Paris every

“third child is illegitimate, and that the sixth of the whole
 “population die in the public hospitals;” whilst Colquhoun
 startles us with the well-authenticated statement, that “in
 “London one-tenth of the entire population are paupers,
 “and 20,000 persons rise every morning without knowing
 “where they are to sleep at night.”

Such being the state of the lower grades of society, our
 prospects, amidst all our modern improvements and partial
 progress, would still be gloomy, did we not feel assured that
 the “schoolmaster is abroad;”—and that our benevolent and
 gracious Queen, and her government, are disposed to turn
 their attention to one of the most legitimate and glorious
 projects upon which they can legislate—viz., Hygiene and
 Medical Pollee, a complete system of which would, in a
 physical sense, go far towards a practical solution of the
 problem propounded by the philanthropic Bentham—viz.,
 “the greatest happiness of the greatest number.”

I propose now to devote a few remarks to the peculiar
 form and characteristics of the *epidemie malignant cholera*.
 The course of the disease, as I before hinted, is distin-
 guished by certain points of difference, accordingly as it
 occurs in the climates of Europe or Hindostan. I have
 already adverted to its pretensions to be classed with dis-
 eases of a febrile type. In entering upon a more detailed
 consideration of this branch of the subject, my endeavour
 will be to prove that the pathology of the disease, though
 peculiar, is not so anomalous or unaccountable as those who
 are unacquainted with the principles of physie may have
 been led to suppose. In the first place, the cholera is as dis-
 tinguishable into stages as any other fever with which we are
 acquainted; these, however, differ from each other, both as to
 their relative duration and virulence. In India, the last stage
 is seldom clearly developed. In all countries, the middle stage,
 or that of collapse, is the most characteristic and critical.

We are told by the best authorities, that in plague, persons are frequently attacked with a sudden and general prostration of strength, and giddiness, coupled with which there are a reduced pulse and a cold clammy condition of the skin, and other symptoms that indicate a general state of congestion; and that these cases often prove fatal without advancing further. An equally rapid and imperfect course sometimes follows the invasion of typhus, and this form has been called by Dr. Armstrong, "congestive typhus." I have myself witnessed these phenomena, and have likewise observed similar symptoms in small-pox, and also an extraordinary sense of uneasiness and oppression in the regions of the stomach and liver. All these instances denote a want of power of reaction in the system, which seems to succumb to the depressing agency of the first blow. Under these circumstances discharges of blood have been known to take place from the stomach and bowels.

The preliminary stage of Asiatic cholera is usually evinced by general lassitude, vertigo, nausea, and great uneasiness in the regions of the stomach and liver; and in general with some degree of ordinary diarrhœa, and griping pains in the bowels. It is more than probable that this premonitory diarrhœa results from the irritation of a peculiarly vitiated bile, produced by the agency of the infected blood upon the liver; and that a complete suppression of bile soon succeeds, and constitutes the line of demarcation between the first and second stages of the disease.

However tenaciously it may be asserted to the contrary, we have ample evidence to prove that neither the vital pathology nor morbid anatomy of cholera have altogether escaped the scrutiny of the more scientific portion of the medical profession. The peculiar phenomena of the malady have been made the subjects of the most earnest investigation by men of the highest eminence in the profession, both at home and abroad; and their discoveries are not without

a considerable share of praetieal value. Amongst those who have directed their seientifie attention to the subject, I may mention the name of the late M. Delpeehe, Professor of Surgery at Montpelier, in France. Guided by the interesting faet, that during the stage of eollapse in eholera, the blood parts with its saline and watery portions, he proposed to make good the defeieney thus morbidly ereated in its fluidity and ehemieal eomposition, by injecting a eopious, but very weak solution of salt directly into the veins. This expedient was no sooner suggested than it was adopted, but unfortunately only in those eases which were the most malignant and hopeless; and therefore they eannot be regarded as affording a fair eriterion of what would be the general therapeutie effieacy of the measure, if resorted to at an earlier period of the disease, we will say at about the time when the serous evaeuations eommence.

The effects of this measure were sufficiently remarkable to exeite the most sanguine exepectations and interest in its favour; for it was found, even in the very last moments of the stage of eollapse, when the body was livid, cold, shrunk, and pulseless, at once to restore arterial aetion, and give the natural eolour to the skin. Under its influenee, the violent spasms of the limbs subsided, whilst “patients sometimes laughed aloud from the eestasy of relief which it “afforded them.” It must be admitted, however, that the effects here deseribed were, in general, but of temporary duration; and the patients, for the most part, soon after the withdrawal of the remedy, relapsed into their former deplorable eondition.

It may not be out of place here to remark, that the solution, which has been generally employed as an injection into the veins, eonsisted of twenty-four grains of earbonate of soda, and two draehms of muriate of soda, with five pints of distilled water. It will be obvious that this is but a very imperfect symbol of the serum of the blood. It remains to be

proved whether the injection into the returning vessels of the circulation of an artificial solution, IDENTICAL in its temperature and saline constitution with the serum of healthy blood, might not give rise to more permanent benefit; especially if it were persevered in at frequent intervals, until the stage of collapse was overcome, and that of febrile reaction established in its place; indeed, until the liver and kidneys had resumed their functions. The pathology of the disease teaches us that these are the desiderata to be kept constantly in view, whatever may be the treatment which we adopt. Unfortunately, the application of this novel expedient is attended with difficulty, and requires considerable skill in its management: it is not likely, therefore, to meet with many practical advocates in the profession. But as our great poet shrewdly observes—

“ Diseases desperate grown,
 “ By desperate appliances are relieved,
 “ Or not at all.”

It yet remains to be proved, also, what might be the effect of introducing mercurial remedies in a state of EXTREME dilution thus directly into the blood; and also whether ammonia used in the same manner might not assist in restoring reaction to the secreting organs, as well as permanent warmth to the frame. Most medical men are familiar with the effect produced upon the liver, salivary glands, and other organs, by friction with mercurial preparations on certain parts of the skin, and especially when the latter are applied on a recently blistered surface.

We know, from the experiments of Orfila, Brodie, Majendie, and other eminent physiologists, upon the lower animals, that various active substances, introduced through a wound on the surface of the body, will produce their specific impressions upon the stomach, heart, and nervous

system; and the presence of certain of them will be manifested in the former organ, with as much certainty as if they had been swallowed. Occasions of accidental or intentional poisoning have shown that the same result takes place in the human subject.

Seeing, then, that during the stage of collapse in cholera, the power of assimilating substances, whether in the shape of food or medicine, by the digestive organs, is lost in a great measure, we have no small encouragement to seek a direct inlet for our remedies elsewhere; and the most available one seems to be the channel of the circulation. Upon the whole, I think, we are by no means justified in hastily condemning this method of employing remedies, since its application hitherto has been so extremely limited. It must be admitted, so far as the project has been tried, that if it has not proved generally curative, it has at all events been attended with temporary relief to suffering, and has been signally illustrative of the true pathology of the disease. I have stated in a former page, that the number of those affected with the epidemic cholera in the upper and middle ranks of society has been extremely limited, but not so much so as has been maintained by some. Dr. Fife says, "Wherever epidemic cholera prevails, every derangement of the organs of digestion is to be regarded with the utmost jealousy, especially if diarrhœa and nausea, with epigastric uneasiness, be present, as in many instances such symptoms barely claim notice, when the most aggravated attack sets in." I agree with Dr. Fife most fully, as to the vital necessity of giving immediate attention to such premonitions, and I believe, moreover, that the terror occasioned at such times has hitherto rendered the better classes of society keenly alive to every ailment; and that by an early recourse to medical aid, the disease has been frequently cut short; and thus, by a prompt restoration of the disordered functions,

its malignant career has been arrested, and the true nature of the attack rendered ambiguous.

The morbid anatomy of the Asiatic cholera has uniformly displayed the general effect of a sedative and acrid poison upon the internal structures of the body. If we examine the circulating vessels after death, we find them occupied with a dark residuum of the blood, more particularly in the veins. The right auricle of the heart is uniformly filled with a sort of decomposed bloody mass; soft coagula of which are also found in the aorta—a characteristic sign, for this great arterial trunk is usually found perfectly empty after death from all other causes. The lungs, liver, and kidneys, are likewise gorged with the same material, which seems rather to be the result of a stagnation of what might be called, with propriety, the “caput mortuum” of decomposed blood, rather than of the crassamentum of that fluid in its ordinary form and quality. The muscular structure of the heart is soft and easily broken down. A considerable portion of clammy, serous fluid is found in the cavity of the chest. Evidences of venous stagnation also present themselves in the structures within the cranium, together with effusion of depraved serum into the cerebral sinuses. The spleen displays the same specific state of engorgement, and, as I before observed, the urinary bladder is invariably found contracted, and empty, in the bodies of those who have died during the stage of collapse.

The mucous lining of the stomach and intestines is usually observed to be soft, and as it were macerated, often completely disorganized, and showing various shades and patches of discoloration. In some instances gangrene has been detected in the large intestines.

There is one remarkable feature which has never been noticed after death from other causes: it consists of spasmodic movements in the muscular structures of various parts of the body, but more especially in the face and extremities. These spasms will take place many hours after

dissolution, and have been happily compared to the effects of galvanism. A striking example of this phenomenon is recorded in the Medical Gazette, which is as follows:—"On September 28th, 1833, a man died of cholera in the Fleet Prison, without any reaction having occurred. Nearly an hour after the breathing and circulation had ceased, his fingers began to move, then the lower jaw, and on the sternum being pressed, the right forearm was suddenly thrown across the breast. These muscular movements lasted twenty minutes." It was probably from events similar to these that the public were prone to imagine that interment sometimes took place, under circumstances where vitality was not really extinct. The blue or livid colour, which is so familiar to those who have witnessed the Asiatic cholera, as well as the shrunken and cadaverous appearance which universally attends the stage of collapse, are both dependent upon the separation of the serum from the more solid constituents of the blood, and its rapid discharge from the body during that stage of the disease. I have already mentioned that a suppression of the functions of the several secreting organs, particularly of those implicated in the process of digestion, obtrudes itself upon the physician's observation as the most prominent feature of Asiatic cholera.

There is no other disease, in my opinion, which has tended so much as this to elucidate those points in physiology, the mysterious nature of which the philosophical inquiries of Stevens, Williams, Liebig, and others, have done much to effect the solution of—I allude to the true sources of animal heat. Until a recent date, the latter was supposed only to be generated by the chemical union of the oxygen of the atmosphere with the carbon contained in the blood in the lungs; nothing more, indeed, than a direct, but subdued form of combustion. This view has been *corrected*, and animal heat is now known also to belong to the chemico-vital changes which take place in the various

secreting organs, of which there are none which exercise greater influence over the modification and purification of the blood than the liver and the kidneys, the uninterrupted performance of the functions of which is essential towards preserving the general health. The due secretion of bile by the liver, and of urea by the kidneys, is of paramount importance in sweetening the current of the circulation.

It is a fact of considerable interest, as bearing upon the views which I entertain relative to the mode by which cholera commences its assaults, that the liver is the only great organ, the peculiar secretion of which is derived from the joint agency of renovated and vitiated blood; the former being conveyed to it directly from the heart through an arterial branch given off from the aorta, and is pure in quality, whilst the latter is transported to the liver through a vein called the "*vena portæ*," which results from the junction of veins of the spleen and mesentery; and the blood which flows through it is extremely impure and dark-coloured: this vein subdivides and ramifies through the whole structure of the liver. As a proof that the *vena portæ* communicates with the hepatic artery, and consequently administers to the same office, it is found that injections thrown into the one penetrate into the other also.*

It is a probable and most rational supposition, that the impulse to healthy action is imparted by the purer blood, or, in other words, by that in the artery; and we can readily conceive how any morbid contamination of this may impair the mutual reaction which takes place, and by which secretion is accomplished. I have given it as my opinion in a former passage, that the epidemic poison is first of all introduced into the blood in the lungs: now, this view corre-

* Many physiologists are of opinion that the bile is entirely secreted from the *vena portæ*; if this be true, it affords us a solitary instance of a most important secretion taking place from venous blood. My belief is that bile (which has a very composite character) is a joint production of the hepatic arteries and the *vena portæ*.

sponds with the facts which are brought under our observation in cholera. As Dr. Joseph Brown of Sunderland remarks, "The evacuations are first found to be fæcal and bilious, but at the time medical aid is summoned, they have generally assumed the serous character which they have in the true choleric stage."

The liver soon altogether fails to act, and with this cessation of its functions the supply of animal heat declines and disappears. The rapidity with which the body grows cold is the most appalling sign of the presence of the disease. This coldness is not confined to the external parts, but the tongue, and breath as it passes from the lungs, show an equal depression of temperature. From these circumstances, it is clear that the chemico-vital changes by which heat is produced are no longer in action, and therefore, the blood, which requires the incessant elaboration of caloric to maintain it in a state sufficiently fluid for circulation, stagnates, and at the same time undergoes what may be termed a living decomposition; and the humours which are effused into the stomach and intestines excite effects not dissimilar to those induced by acrid poisons, such as arsenic. It is worthy of notice that the breath is much less charged with carbonic acid in cholera than it is during healthy respiration. Before entering upon the special means of prevention and treatment, I shall take a review of the symptoms of the disease in its several stages in succession.

In the more protracted cases, in which the whole course of the Asiatic cholera is regularly developed, its onset is denoted, with but few exceptions, by diarrhœa of the ordinary kind; this is attended with gripings, and an unusual sense of exhaustion, conjoined with nausea, and a most distressing uneasiness in the epigastric region. This premonitory state may be in advance of the more severe symptoms, in some instances by only a few hours, whilst in others it may include a space of several days. It is at this early period

that judicious and prompt treatment has been for the most part found to check the progress of the disease. Its existence is commonly not so fleeting, and then during the night-time the malady will abruptly show the true malignity of its nature by a sudden aggravation of the previous epigastric uneasiness into pain of an agonizing character, presently followed by the most obstinate vomiting and purging of fluids, which have been not inaptly compared in their appearance to rice-water. The retchings come on in paroxysms, which are indomitable, and the quantity discharged in this way appears inexplicable unless it be considered that it is principally derived from the blood. The countenance soon becomes livid, and displays a shrunken and ghastly expression. The breathing is hurried, and apparently accomplished by a voluntary effort, and with difficulty, whilst, at the same time, the action of the heart is painful, feeble, and frequent. Excruciating cramps seize the limbs, and frequently extend to the heart, and the system of muscles engaged in the function of respiration. A total suppression of animal heat coexists with these symptoms, and the surface is intensely cold. The general bulk of the body is contracted, and the shrivelled condition is seen in the hands, fingers, and tongue. A chill, clammy moisture bedews the skin; the thirst is insatiable; the voice is sunk and sepulchral; and at the more advanced period of collapse has been described by Dr. Barry to resemble "the low whine, like that of a dog dying from arsenic." At times, however, the patient evinces the agony of his sufferings by the most piercing shrieks. In addition to the foregoing symptoms, the eyeballs are sunk in their sockets, and upraised, whilst the lids are partially closed. On examining the pupils they are usually found much dilated—denoting an impairment of the optic sensibility. In a few hours, varying from six to twelve, the stage of collapse is complete, when the vomiting and purging cease, or only recur at long

intervals ; the pulse is altogether imperceptible, and the leaden discoloration assumes a "deeper dye," especially in the face and extremities. A peculiar eadaverous odour exhales from the body. The extremities and the heart are still tortured by the most agonizing cramps and spasms ; and although the patient is painfully conscious to the very last of his miserable condition, the bystander is almost constrained to believe that he sees before him nothing more than a putrefying and lifeless corpse.*

Even in the extremes such as I have attempted to delineate, the powers of nature will often rise superior to the dilemma, and reaction will take place in the very last emergency ; it is this event which truly constitutes the third stage of the disease, and it is this which evinces its febrile type.

It appears somewhat singular that in India, according to the best accounts, in many of those cases which recover, the febrile reaction is, for the most part, barely perceptible, and in all cases out of proportion to the violence of the previous symptoms. Upon reflection, this contingency is not at variance with some species of intermittent fever, in which the separate stages are well defined. It has been observed, in an analogous manner, that the violence and length of one stage seems to abridge the activity and duration of its successor.

In northern latitudes, the febrile or third stage of the Asiatic cholera is generally well marked in those cases which survive the collapse ; and that which by some has been described as a subsidiary or distinct attack of typhus fever, is in reality a part of the original disease—the last links, as it were, in a chain of phenomena which constitute the regular series of the epidemic. The transition from the collapse

* Hiccup is another symptom in the advanced stage of collapse, and, by some, considered a favourable one. It may here be remarked that the ordinary course of the disease, when it proves fatal in the stage of collapse, occupies a space of about twenty-four hours from the commencement of the characteristic symptoms to the close.

to the febrile stage is generally gradual, and is indicated by a return of the arterial pulse, and of the secretions, together with the simultaneous restoration of the natural warmth. In some instances, this renewal of the vital and organic energies occurs without any high degree of feverish excitement; in others, symptoms of severe cerebral disturbance shortly supervene, such as violent pain in the head, vertigo, intolerance of light and sound. The eyes are usually much congested with blood. These symptoms are soon succeeded by delirium, and at the same time the tongue presents a parched and dark-brown surface; the skin is hot and dry, and the pulse greatly accelerated. All these circumstances tend to show the intimate alliance which subsists between this part of the disease and typhus fever.

We are not to imagine, because the patient has escaped the perils of the collapse, that he has necessarily reached a haven of safety; so far from indulging a feeling of such false security, our attention should be quite as unremitting as heretofore; for the tendency to destructive internal local inflammation, both of the brain and gastro-enteric linings, becomes a source of imminent danger, which at this juncture we are more especially called upon to obviate. Dr. Fife is of opinion that the violence of the febrile reaction is proportioned to the intensity of the collapse, which opinion does not correspond with the history of the disease in India, for there, as I have previously remarked, its course was peculiarly rapid, and the collapse extreme, whilst in those cases which recovered there was but slight manifestation of febrile reaction.

Although it becomes a matter of leading importance to repress the undue and dangerous excitement above referred to, the medical attendant should be cautious as to the use either of local or general depletion, until the reaction is thoroughly established. Cruveilhier, a celebrated practitioner

in Paris, says, that “he, in several instances, observed a
 “cessation of reaction immediately after premature bleed-
 “ing, the patient becoming blue again, and this was speedily
 “followed by a fatal termination.” Having so far described
 the dismal concatenation of events which characterize the
 more protracted cases, I shall briefly observe that there
 is another class in which the SHOCK of the pestilence is so
 violent, that the disease attains the zenith of its career in a
 very short space of time, not exceeding three, four, or six
 hours from its commencement to its close. In such cases,
 the symptoms heretofore detailed are more crowded toge-
 ther, are less under control, and are almost uniformly fatal.
 It has been remarked that this liability to a sudden attack
 and hurried progress occurs more frequently at the outbreak
 of the epidemic in any locality.

Should it unfortunately happen that cholera revisits this
 country,—and signs and tokens are not wanting to justify
 such an anticipation,—we shall be called upon, both indi-
 vidually and collectively, to adopt the best means to with-
 stand its evil influence; and with this object in view, I shall
 now offer a few suggestions on the subject of special pre-
 vention. In our climate, above all things, it is necessary to
 maintain a warm and equable temperature in our dwelling-
 houses, both by day and by night; insomuch that the poi-
 sonous miasm of cholera shows a propensity to unite with
 moisture, by which its activity is increased. On the other
 hand, a dry atmosphere, free from all collateral impurities,
 will at all times materially weaken its epidemic force. The
 counteracting agencies of warmth and dryness may be
 exalted and rendered more effectual by an intermixture
 with the air of certain artificial gases; and of these ehlorine
 is at once readily obtained, and possesses the most anti-
 septic and purifying properties. It is well known to decom-
 pose and render innoxious those multiform exhalations

which are the results of animal and vegetable putrefaction. We must at the same time remember, that in itself, or without considerable aërial dilution, it will not support respiration, but when added in small proportions to the atmosphere its effects upon the organs of breathing, and the system in general, may be deemed salutary.

In illustration and proof of this proposition I may mention that I have frequently employed it, by the method of inhalation, in chronic disease of the lungs, with signal advantage, both to the local and general symptoms; and I remember three somewhat advanced cases of a consumptive nature, which recovered under its use. If, however, it is employed in too concentrated a state at first, the remedy will produce irritation in the larynx and trachea, which sometimes discourages patients from persevering in its use, however modified. I have noticed great caprice in phthisical persons, so much so, that if a remedy does not immediately relieve their complaint, they lose all faith in and often prematurely abandon it. To return, however, to the question before us. Providence has placed within our reach an ample supply of the material from which chlorine is the most easily obtained. For the benefit of non-professional readers, I may observe, that in combination with soda, chlorine forms one of the necessities of life—viz., common salt.

It is rather remarkable, that whilst chlorine, in a free state, exercises so neutralizing an effect upon the various subtle and deleterious compounds which float in and help to beget a distempered constitution of the atmosphere, in its saline combination with the fixed alkalis, more particularly with soda, it should impart to vitiated and dark-coloured blood (as was abundantly proved some years since by the experiments of Dr. Stevens, recorded in the "Philosophical Transactions" for the year 1835,) a healthy tint and character. Indeed, its proper admixture seems essential to the

arterialization, or in other words, to the purification and renovation of the blood. If we bear in mind the specific impulse which the cholera poison manifests to deprive the blood of its natural saline constituents, it will be evident, that the action of salt, as a vital stimulant, deserves our consideration, both in a preventive and remedial point of view. The virtues of saline remedies in fatal epidemic diseases were not unknown to the ancients, for instance, Aretæus informs us, that in a great pestilence (*morbus cardiacus*) which raged at various times, from 300 B.C. to 200 after Christ, the hands and feet turned blue, &c.; and we learn from Cœlius Aurelianus, that the "Greek salt wine," *οινος τεθαλασσωμενος*, a mixture of wine and sea-water, was very much in vogue as a remedy. This disease is supposed to have strongly resembled, if it was not identical with, the "sweating sickness" of the "middle ages."

Chlorine gas may be readily extricated from muriate of soda by combining the latter with black oxide of manganese, and by the subsequent addition of sulphuric acid. In order to produce an effectual fumigation, I cannot improve upon or reeommend a better plan than that proposed by Mr. Herapath. He says, "A mixture of three parts of common salt, and one of black oxide of manganese, should be placed just inside the outer or street door of the dwelling-house, in an earthenware pan, and a little common vitriol poured upon it. The inward current of air will convey the ehlorine gas to every part of the interior, and where it can be smelt, the effect is produced—the miasm is destroyed."

This might be repeated two or three times a day during the existence of the epidemic in any locality. Amongst other disinfecting agents, we may direct attention to ehloride of lime and zinc; these are economical preparations, and are well adapted both for public and private purposes of atmospheric purification. For example, they may be fre-

quently thrown into drains, cesspools, and all other receptacles for animal and vegetable refuse; they may be used also with great advantage in sick chambers, hospitals, slaughter-houses, dissecting-rooms, and, indeed, in all places which are not contrived so as to prevent the stagnation of noxious effluvia in their immediate atmosphere.

Our conduct becomes culpable if we remain passive when we know that we can derive a certain degree of protection from disease by the application of such expedients as are here described; neither is it sufficient to make use of the precautions referred to by fits and starts; they should be habitually and assiduously employed, particularly in the tenements of the poor in densely populated districts. If we would turn the discoveries and inventions of science to the most useful account, we should not only adopt sanitary practices in our own establishments, but should disseminate both the means and information for so doing far and wide amongst our poorer and less instructed neighbours.

Unfortunately for mankind, ignorance and error are the rule, whilst knowledge and truth form the exceptions. Mr. Alison says, "Among every thousand of mankind, there may probably be found forty or fifty who will derive pleasure from the discoveries of science, or the pursuits of literature and philosophy; but unquestionably there will never be found more than that number." It may be said to be owing to the disuse of the powers of the understanding, that persons in general, when called upon to abate a nuisance, or, in other words, to remove some nucleus of atmospheric contamination, ridicule the requirement as absurd, and when enforced by the strong arm of the law, they regard it as an arbitrary exercise of authority, their false notions of private interest being a blind to the due perception of what is demanded at once for their own and the general benefit. To treat with indulgence, or even for a brief period to tolerate

such reservoirs of disease and death, is nothing more than a palpable breach of our duty towards our neighbour and ourselves. Delay in all such cases becomes the more dangerous when epidemic pestilence threatens to decimate the kingdom.

In a sanitary point of view, we are hardly able fully to estimate the value of a copious and never-failing supply of pure water in towns. Without this, no system of sewerage can be perfect, or fulfil the intended purposes of atmospheric purification. It is a melancholy fact, that in some of our large manufacturing towns, particularly in the poorer and ill-ventilated quarters, this necessary element of cleanliness and health is actually brought round and sold by the bucket-full. Every rational being must feel satisfied that the time has arrived for legislative interference in these matters. Amongst other means which assist in purifying an unwholesome atmosphere, I may mention lime, which may be everywhere obtained at a trifling expense. We might premise, from the eagerness with which this substance absorbs moisture, and from its known affinities for various poisonous gases of which sulphur and hydrogen enter into the composition, that its antiputrescent properties would be considerable. Experience has proved this agent to be entitled to our greatest confidence. Lime-washing should be encouraged in all buildings, and especially in those that are densely thronged, and as far as possible, by repeated applications. I need hardly add, that all offensive drains should be examined, and where necessary, repaired and properly cleansed and closed. All accumulations of filth and stagnant moisture should be removed; indeed, with the prospect of cholera coming again amongst us, no effort should be spared to render the air we breathe pure and unadulterated by accidental effluvia, over which we have the power to exercise control.

The choice of clothing is of signal moment, as a means of

prevention to epidemics—cholera, and influenza, &c. With a view to obviate those stagnations of the blood which often proceed from the impressions of a cold or damp atmosphere, made upon the surface of the body, and which, at the same time, cause a sudden check to the cutaneous transpiration, nothing is more to be upheld than the liberal use of woollen materials, and *especially of flannel next the skin*. A most absurd and groundless prejudice has of late years been created in the minds of some persons against this truly valuable article of dress, to which cotton, though an useful auxiliary, can never be otherwise than an inefficient substitute. The salutary merits of flannel are, however, too strongly supported by experience and good report to be easily banished from public estimation by the ephemeral voice of fashion. “It is well known,” says the talented Dr. Combe, “that flannel and warm clothing are extremely useful in preserving those who are unavoidably exposed to the action of malaria, and of epidemic influences; and these manifestly act chiefly by protecting the skin.” A late writer on the malaria of Rome, stoutly advocates this opinion, and expresses his conviction—“That the ancient Romans suffered less from it, chiefly because they were always enveloped in warm woollen dresses.” At the present day we are told “the shepherds, in the warmest weather, are now clothed in sheep-skins!”

According to Patissier, a celebrated French authority, similar means have been found efficient “in preserving the health of labourers, digging and excavating drains and canals in marshy grounds, where previously to the employment of these precautions the mortality from fever was considerable.” “In the army and navy,” adds Dr. Combe, “where practical experience is most followed, the utmost attention is now paid to enforcing the use of flannel and sufficient clothing as a protection against fever,

“dysentery, and other diseases, particularly in damp and “unhealthy climates.” Sir James M‘Grigor testifies that in the Peninsula, the best-clothed regiments were the most healthy. And Sir George Ballingall, in his Lectures on Military Surgery, says, that “in India he had himself a “striking proof of the utility of flannel in checking the progress of a most aggravated form of dysentery, in the “second battalion of the Royals.” Dr. Combe continues— “Captain Murray, late of H. M. S. ‘Valorous,’ told me that “he was so strongly impressed, from former experience, “with a sense of the efficacy of the protection afforded by “the constant use of flannel NEXT THE SKIN, that when on “his arrival in England, in December 1823, after two years’ “service, amid the icebergs on the coast of Labrador, the “ship was ordered to sail immediately for the West Indies, “he ordered the purser to draw two extra FLANNEL shirts “and pairs of drawers for each man. These precautions “were followed by the happiest results : he proceeded to his “station with a crew of 150 men, visited almost every island “in the West Indies, and many ports in the Gulf of Mexico : “and notwithstanding the sudden transitions from extreme “climates, he returned to England without the loss of a “single man, or having any sick on board on his arrival.”

We know that dry heat promotes a free exhalation both from the skin and lungs ; hence we can explain why an elevated temperature, aided by woollen clothing, obviates the absorption of moisture, and at the same time of atmospheric poisons into the circulation.

The sudden transitions of temperature, to which the skin of persons who enter into a round of visiting during the winter season particularly, is exposed whilst passing from hot and crowded rooms and assemblies, into the cold open night air, calls for the protection of woollen clothing next the person, in an especial degree. It is well known matter

of fact, that the scanty clothing of females compared with that of the other sex renders them much more liable to bowel complaints, coughs, and enlarged glands, as well as to other dangerous obstructions. For the same reason their bodies are more exposed to the assaults of any ruling epidemic, and a fatal attack of malignant sore throat or fever has too often attested to the truth of these assertions.

Dr. Beddoes says, that although the Dutch inhabit a damp climate, they seldom suffer from colds, which he attributes to their abundant use of fuel and woollen clothing. In the event, then, of cholera again making a séjour amongst us, Charity cannot take a better office than that of distributing a plentiful provision of coals, flannel, and blankets, amongst the destitute members of the community.

Although I advocate, in unmeasured terms, the universal employment of flannel, as well as of artificial heat and dryness in our habitations, I am equally confident of the great protective power to be derived from the daily practice of ablutions of the entire surface of the body with SOAP and WATER. I believe no single measure tends so much to fortify the frame, at all seasons, against diseases in general, those of the skin and mucous membranes in particular. It is by such means that a free scope is given to the important function of cutaneous transpiration.

I am not aware that rubbing the surface of the body with oil has ever been proposed as a preventive to the infection of the epidemic cholera. In those countries where plague may be said to be epidemico-endemic, the custom is common enough. Dr. Mason Good says, that "in the pestilence at Noya, it was accounted 'the sovereignest thing on earth.' " In Malta, it was in great repute, "and no attendant on the infected imbibed the disease as long as he was regular in rubbing himself with oil." The expedient was upheld by Sir Brooke Faulkner before a parliamentary committee, and

Mr. Baldwin, of Cairo, states, that “among upwards of a million of inhabitants carried off by the plague in Upper and Lower Egypt, during the space of four years, not a single dealer (dabbler?) in oil had fallen a sacrifice to it.”

Such being the testimony in its favour, there seems every inducement to adopt it as a means of prevention, especially in receptacles for cholera patients, to avert the attack of the impending epidemic.

Without at all impeding exhalation, the property of oil, as a nonconductor of heat, well qualifies it for the office which it is thus intended to fulfil. We must remember that the heat here referred to is that generated by the inherent powers of the living body, and that by preventing a too rapid transmission of this into the surrounding air, we economize a stimulus of the highest value in sustaining a vigorous action of the capillary vessels on the surface. It may be argued, too, that oil, being a sort of antithesis to moisture, and as damp vapours seem to afford a condition favourable to the activity of the epidemic miasm of cholera, so, by repelling the one, it may fairly be expected to exclude the other also, more particularly if, as some suppose, the specific poison of the disease gains admission through the pores of the skin.

The subject of diet still remains to be considered with reference to this subject, and I have no hesitation in giving it as my conviction, for it is borne out by general experience, that excesses of the gin-shop and dram-drinking predispose their victims to the worst inflictions of this monster epidemic. Of all vices, that of spirit-drinking is the one which most demoralizes the mind and debilitates the bodily constitution. When I was pursuing my studies in Edinburgh, during the visitation of cholera in 1831 and 1832, I had ample opportunity of ascertaining that the class of persons more usually attacked by that disease consisted of those who habitually indulged in copious potations of whisky, which, as may be supposed, is

not always of the purest quality. The excessive use of ardent spirits of all kinds may justly be pronounced the most fruitful predisposing cause of this and of most other diseases.

A generous diet, embracing the liberal use of butcher's meat, game, and poultry, as well as of farinaceous materials, especially rice, cannot be too strongly recommended. At the same time, the more wholesome vegetables, such as turnips, artichokes, and potatoes, free from taint, need not be altogether excluded from the "bill of fare," since Asiatic cholera evinces an analogy to scurvy and other diseases that are characterized by a dyscrasy or impoverished state of the blood, and we know that this state is both prevented and corrected by the moderate use of vegetable esculents. Crude or uncooked vegetables are, however, open to objection, especially where the powers of digestion are weak, or easily deranged. I consider the indiscriminate denunciation under which fish and fruit laboured when cholera first visited this country as nothing more than a bugbear to frighten the nervous and dyspeptic; for I cannot recognise any scientific or practical foundation for the prohibition. I well remember, that during the whole time when cholera raged in Edinburgh and its neighbourhood, I rarely dined without fish, which is both abundant and of excellent quality in that city. The same statement holds good with respect to most of my acquaintance, many of whom were in the daily practice of visiting the cholera hospitals, and were not unfrequently engaged in dissecting the dead bodies of the patients. None of them, to my knowledge, caught the disease.

The kinds of fish to which I should at all times give the preference, in consideration of their more wholesome properties, are, turbot, cod, whiting, and haddock; whilst shell-fish, such as oysters, lobsters, crabs, mussels, &c., from their being sometimes observed to occasion intestinal and euta-

neous irritation, deserve our unqualified censure, as long as Asiatic cholera is an object of apprehension and danger to us.

With regard to the use of fruit, I will admit that discrimination is required, and none should be eaten which is not perfectly ripe; neither would it be prudent, or in accordance with dietetical principles to partake largely of the more wholesome kinds, such as strawberries, grapes, oranges, figs, and some others, when the stomach is loaded with other food.

Observation having unfolded the fact that the body is more liable to morbid infection whilst the stomach is empty, it is clearly advisable to avoid exposing ourselves, if possible, to the range of a contaminated and an impure atmosphere under such circumstances, and especially before breakfast. Another provision of safety may be derived from the same consideration—viz., that we should allow only moderate intervals to elapse between meals during the prevalence of this or any other epidemic.

Salt should at all times be used with freedom, even to the extent of double or treble the ordinary amount of its consumption. The salutary properties of this substance cannot be too highly commended; its usefulness, both as a remedy and preventive in Asiatic cholera, needs no other demonstrations than those presented to us by the investigations of Dr. Stevens. Mr. A. Alison, though a non-professional authority, shows his sagacity on the subject, when he says, "This substance (salt) seems not only universally agreeable to the taste of men, but highly conducive to their health." Mustard is another stimulating condiment of no mean virtue, and may be taken at all our meals with advantage, inasmuch as it favours the healthy action of the kidneys, and I believe of the liver likewise.

It is scarcely necessary to remark that ice, or cold and sour drinks, are likely to prove prejudicial. Although ex-

cess and intemperance in eating and drinking &c. should be strictly avoided, it is by no means desirable or beneficial for those who have the fear of cholera before their eyes, to discard either wine, brandy, or malt liquor from their tables. With respect to the choice of wines, I may observe that those from Spain and Portugal are justly regarded as possessing more cordial properties than the French or German wines. Nevertheless, the richer and more generous kinds of the latter, such as hock and claret, when free from acidity, are regarded by some as more medicinal than the former, and not so likely to prove prejudicial as sherry or port. To valetudinarians, or those who suffer from want of tone in the stomach and other organs of digestion, I believe a moderate allowance of brandy, whisky, or curaçoa, diluted with water, will be found a more safe and serviceable stimulus than either wine or malt liquor of the average quality. I must not omit to mention in terms of approbation a composition which of late years has superseded to a great extent all other kinds of malt liquor,—I mean the bitter ale. Although originally made at Burton, this beverage is brewed in many large towns throughout the kingdom. It is no small recommendation, that in British India, where cholera is an almost continual subject of apprehension, bitter ale is the only form of malt liquor whose wholesome qualities can be safely confided in.

I shall conclude the subject of Prevention by quoting a remark from Dr. Armstrong, that “courage is at all times better than camphor;” and by inculcating a rigid observance of regularity in our habits of *sleep* and *exercise*; for upon the uninterrupted succession of action and repose depends in the highest degree the maintenance of the health both of the mind and body.

Lastly, I propose to examine the merits of those modes of treatment which have hitherto been found the most successful

in mitigating the pangs and lessening the mortality of this formidable disease. I cannot indicate a more decisive proof of the general value of medical resources than by referring to the Report delivered to the medical board at Bombay, wherein it is recounted, that out of 15,945 cases of malignant cholera, 1294 had been without medicine or medical relief, and it was believed that every individual of the latter number perished. It is therefore by no means fair to impute to the profession that we are ignorant of the nature and treatment of the epidemic, because we appear to be unprovided with ONE SPECIFIC ANTIDOTE wherewith, on all occasions, to arrest its fatal progress. Our experience of other maladies clearly shows us that such an expectation is chimerical; for example, in smallpox, measles, scarlatina, typhus, influenza, plague, &c., we know of no special antagonist which can be depended upon as an universal remedy. The terms "specific" or "panacea" may be left, therefore, to the undisputed possession of empirics and nostrum-mongers.

There is no disease in which the "obsta principiis" rule is of so much importance as it is in the "Asiatic cholera," for where early and proper attention is directed to the disease, there its malignant features are but rarely developed.

In the first place I shall briefly consider the question of bloodletting, and I will not disguise the fact, that this measure has found advocates of the greatest celebrity at home and abroad, both in the military and civil departments. Hufeland maintains, that by means of early bleeding and emetics the disease is INVARIABLY cured. I cannot, however, accord the same amount of praise to this expedient. The ostensible principle upon which the remedy is founded is the removal of congestion, and with this intention may be suited to those cases which sometimes occur in persons of more robust habit; but we know that the disease, for the most part, attacks those who are ill fed, and exposed to the privations of life; and where bloodletting is resorted to under such circumstances,

if it is to be regarded as the least of two evils, we must admit that, in many instances, the remedy has but a slight advantage over the disease. It was precisely with the same motive of removing congestion that the late Dr. M^cIntosh, some years ago, inculcated in his lectures the novel practice of bleeding in the cold stage of intermittent fever, which gave rise to a very hot and irritable controversy between him and some of the medical authorities in the army; and I believe we may say, "*adhuc sub judice lis est.*" Mr. Annesly, the eminent writer on the diseases of India, says he saved nearly all the patients whom he bled; but we must remember that this was in the average climate of India, and, as a commentator observes, "it must be recollected that this could not have been in the collapse, because then very little blood could have been obtained; the circulation in his examples must have been going on briskly, and therefore they were favourably circumstanced for the practice." Those who advocate the indiscriminate use of bloodletting may argue that whilst congestion is thereby removed, a portion of the poisonous material is also withdrawn from the circulation; that the tendency to collapse is thus diminished, and that of reaction strengthened. This doctrine does not harmonize with our mode of procedure in other diseases which are marked by such extraordinary debility; but, as Dr. Hamett observes, "Cholera is, perhaps, the only disease in which bleeding and stimulants are both admissible at the same time on just principles, as well as from the obvious benefit derived from their use." I cannot, however, but admit that the action of calomel, our chief reliance in Asiatic cholera, is often accelerated and promoted by a small abstraction of blood, and these I consider to be the best grounds on which the measure can be defended. It will be obvious, from the foregoing remarks, that the question of bloodletting requires very nice judgment in individual cases of the disease.

Stimulating emetics are of infinite service in the early

stages of the Asiatic cholera. The timely compression which they exert upon the abdominal viscera generally, and upon the liver in particular, tends to rouse an immediate reaction in all those parts, as well as in the circulating and nervous systems. The vital and organic functions are called into full play, and by these means the disease is often cut short in its infancy. A table spoonful of mustard and the same quantity of salt should be given in a cup of water. The emetic action which soon follows is different from that which ensues from such substances as antimony or ipecacuan, both of which depress the nervous system; whilst mustard and salt, to which may be added, carbonate of ammonia, prove at one and the same moment, emetic, cordial, and stimulant, throwing the blood effectually upon the surface, and thereby acting as a counterpoise to internal inaction and engorgement, which lead to the passive serous defluxions that prevail in the stage of collapse, and which induce the condition we have so much reason to dread.

Dr. M'Gregor, surgeon to the first European regiment in India, refers the proximate cause of cholera to a peculiar state of the gall-bladder, and he extols in the highest terms a combination of croton oil and opium, in doses of from three to five drops of the former to from two to three grains of the latter, which he supposes to act beneficially by emptying the gall-bladder. This remedy may be classed with the foregoing as to its immediate action, and in Dr. M'Gregor's hands was wonderfully curative. My own opinion is, that it acts like calomel in restoring the function of the liver.

An early application of artificial heat is likewise of the utmost value and importance. The most convenient and effectual method of accomplishing this is by means of the hot-bath. Whether the medical attendant has arrived or not, this expedient should be put into immediate requisition. The heat may be carried as high as from 100° to 120° Fahr.,

salt or mustard, or both, may be added to the water with considerable advantage. After remaining in the bath for twenty minutes or thereabouts, the patient should be lifted out without any personal effort of his own, and should be at once received into hot blankets, previously in readiness. Whilst thus enveloped, the body should be placed in a warm bed, and rubbed perfectly dry. A current of warm air, for the production of which there are several simple contrivances, should then be passed under the bed-clothes, so as, if possible, to sustain the natural temperature.

The testimony of both Oriental and European physicians is in favour of a remedy, the employment of which, the ordinary principles of medical judgment would point out to us as our sovereign reliance; and those who differ on other points of the treatment coincide in the opinion, that calomel is the most successful medicine towards securing a favourable result in Asiatic cholera. Whatever the homœopathists may advance to the contrary, its allopathic or alterative powers are beyond dispute. Administered early, and in *large* doses, it has invariably proved the best antidote to this dreadful scourge.

To use the language of Dr. Christison,—“It was stated, not
 “ many years ago, by several East India surgeons, appar-
 “ rently with the universal assent of all their brethren in
 “ later times, that this drug (calomel) in the dose of a scruple,
 “ administered even several times a day, is not only not an
 “ irritant, but even, on the contrary, a sedative; and that in
 “ some diseases—for example, yellow fever—it has been given
 “ in the dose of five, ten, or twenty grains, four or six times
 “ a-day, till several hundred grains were accumulated in the
 “ body, yet without causing hypercatharsis, nay, with the
 “ effect of checking the irritation which gives rise to black
 “ vomit in yellow fever, and to the VOMITING and PURGING
 “ observed in the CHOLERA of the EAST.”—“It is quite im-

“possible for a European physician to deny these statements; for all practitioners in hot climates concur in them to a man; and now that analogous practices have been transferred to Britain, repeated opportunities have occurred for establishing the fidelity of the original reporters.”—“I have myself,” adds Dr. Christison, “employed the method in question.”

I may cite also a remark, from his essay on the subject, by Dr. Brown, of Sunderland. In the early stage of the disease, as it appeared in that town, he says, “it was found very advantageous to give doses of calomel (ten grains), with from one to two grains of opium, and some aromatic.” I need hardly observe, that the special object of the remedy is to restore the action of the liver, and with it the functions of the other secreting organs. As may be gathered from the preamble of this “Discourse,” such effects imply the re-establishment of animal heat. Dr. Baum and Dr. Hamett speak in praise of mercurial frictions to various parts of the body, with a view to promote the constitutional action of the remedy. Although it is so much the fashion now-a-days to introduce therapeutic agents into the system, by means of inhalation, I am not aware that it has ever been proposed to use mercury in this manner, in the collapse of cholera; and yet Dr. Christison assures us, that “one of the readiest modes of bringing the system under its action, is by introducing its preparations into the lungs.”

Having exhibited a large dose of salt in the first instance, we may afterwards employ it in smaller proportions; and perhaps the best mode for its administration is to dissolve it in water, or broth, to which some burnt brandy may be added, with a few grains of powdered capsicum, both of which stimulants have been commended by physicians who have had experience in the treatment of cholera. Chlorate of potass has been found an useful auxiliary in some cases, as well as carbonate of soda. I should give the preference

to ammonia, in consideration of the warm impression which it causes even when applied to the surface of the skin. The object of our perseverance in the saline treatment is to sustain, if possible, the natural constitution of the blood.

In those cases where the true choleric stage becomes established, and the vomiting, and purging, and other characteristic symptoms, have gained the mastery, benefit has been found to arise from the use of astringent glysters. Mr. Brown, surgeon to the 37th Regiment, states, that he has found a strong decoction of catechu, used in this way, to be serviceable. The quantity employed at a time should not exceed half a pint, and with this a teaspoonful or two of laudanum and a small portion of salt may be conjoined.

Mr. John Fife, of Newcastle, found benefit in the stage of complete collapse from the use of a copious enema of brandy, water, and laudanum: he also found a drachm of mustard exhibited in the same way to restore the urinary secretion.

As it is obvious that the defluxions of cholera occur on the mucous membranes of the alimentary canal; and taking the aphorism "*ubi irritatio, ibi fluxus*" as our guide, we might rationally expect some good to result from producing a revulsion of the serum of the blood, from the internal surfaces to the skin, and thus turning the tide of the disease into a less dangerous channel. Now, experience is not wanting to testify to the practical value of this intention. The vehemence of the vomiting and purging has frequently been arrested by instituting a vesication over the entire surface of the abdomen. As we cannot well wait for the slow action of an ordinary blister, the object may be more easily, certainly—nay, almost instantaneously effected by means of lint, or any other suitable substance, saturated with strong liquor ammoniæ, and applied to the skin "*secundum artem*." Mr. Farr, a talented surgeon, belonging to the Ordinance Medical Department, and who, whilst stationed in Canada during the years 1832, 1833, and 1834, had the immediate

charge of several hundred cases of cholera, asserts, that "in the more desperate cases, the more the patient's body was covered with blisters, the better chance he had of recovery." In one particular case," says he, "this treatment was fully acted up to in a second attack of cholera, when the patient had been perfectly collapsed for nearly fifty hours, after which he as perfectly recovered."

Dr. Graves, and Dr. Cranfield, of Dublin, both commend as a remedy the superacetate of lead, which seems to restrain the serous effusions, which mark the true choleric stage of the disease. I have no doubt the efficacy of this remedy might be enhanced by the addition of distilled vinegar, and from one to three drops of creosote, to which a small portion of Batley's sedative might be added with the prospect of advantage. The power of creosote in allaying vomiting, entitles it to some consideration as a remedy in cholera, especially when we take into account the great antiputrescent qualities of this singular material, which, as Dr. Christison informs us, "is probably the most important ingredient of the materials used in the Egyptian mode of embalming." Creosote is at once styptic, anodyne, and stimulant in its properties, and hence its employment in Asiatic cholera is strikingly indicated. The power which the superacetate of lead has in restraining vascular relaxation, is well evinced by its therapeutic effects in hæmorrhage of the passive kind.

In a severe case of hæmoptysis, which some months since came under my treatment, and in which as much as five or six pints of blood had, within a comparatively brief space of time, been discharged from the lungs, I administered this remedy with the acetum distillatum, and a small portion of Batley's sedative for several weeks together, not only with relief to the hæmorrhage, but with marked advantage to the general health. This patient, in addition to the hæmoptysis, and extreme emaciation, had, from his drinking habits, con-

tracted chronic disorder of the liver, denoted by a jaundiced complexion, foul tongue, obstinate constipation, &c. Under the foregoing treatment, the bowels became regular, and the secretion of bile was perfectly restored. I adduce this case to show that the superacetate of lead, in the combination which I employed, does not, whilst restraining passive hæmorrhage, or serous effusions, act otherwise than beneficially upon the FUNCTION OF THE LIVER.

The burning sensation in the stomach which prevails during the collapse, gives rise to incessant craving for cold drinks. My opinion is, that the blistering already proposed is one of the most effectual antidotes to this symptom. Ice has been made use of by some practitioners, and appears sometimes to have proved grateful to the feelings of the patient; others have indulged the sufferer's AGONIZING thirst with copious draughts of cold water. Cruvelhier, "after making "a comparative trial, in Paris, of these and hot drinks, "declares in favour of the latter,"—and that reaction much sooner takes place under their use. I should prefer as a palliative to this distressing symptom some mild astringent drink, such, for instance, as a simple infusion of black tea, which might be drunk *ad libitum*. This beverage is agreeable to the palate of almost all persons; and whilst it possesses some sort of remedial pretension, Liebig, the celebrated German chemist, has lately ascertained that theine, the active principle of the tea-plant, is nearly identical in its composition with taurine, the nitrogenous constituent of bile, and hence may be argued to possess nutritive properties.

The internal sense of heat above referred to seems to arise from a cause very different from ordinary gastric inflammation, and may rather be attributed to some anomalous susceptibility of the nerves of the stomach, whilst irritated by the transudation of acrid serum through the tissues of that organ.

The violent cramps which affect the extremities at a very early period of the stage of collapse may be mitigated by assiduous frictions with oil of turpentine, with ammonia, or camphorated oil; however, nothing has been found to allay these excruciating pains and involuntary muscular contractions so effectually as the abundant external application of oil of turpentine.

An infinite number of stimulant and antispasmodic medicines have been used and praised by some practitioners, whilst they have in turn been condemned as useless by others. From a list of many other ingredients of the same class, I may enumerate oil of cajeput, oil of aniseed, oil of juniper, oil of valerian, &c., to these may be added musk, ambergris, Dippell's animal oil, and castor; the succinated spirits of ammonia, and various preparations of æther and of opium. A German physician has lately recommended sulphuric acid, with some of the volatile oils above enumerated, as a CERTAIN ANTIDOTE! For reasons which I have before detailed, I have but little faith in these stimulants; but those to which I should give the preference, as auxiliaries in the early stage, would be burnt brandy and spirits of ammonia, besides others which I have described in a former page.

The inhalation of oxygen and nitrous oxide gas has been tried; but hitherto we have but little testimony in their favour; perhaps their more extensive employment will entitle them to greater confidence. The inhalation of æther has, I understand, in several instances not only afforded relief to the pains, but has been followed by recovery. We have every reason to anticipate favourable effects from the agency of the newly discovered fluid, chloroform, administered in the same manner. Its well attested property of creating insensibility to pain, renders it more than probable that if it will not always effect a cure, this material

will be found a very general palliative to the insufferable spasms which accompany the collapsed stage of the Asiatic cholera.

I believe that writers in general on the treatment of this epidemic, have disregarded the intimate relation which subsists between the secretions of bile, urine, &c., and animal heat. I am persuaded that physiological inquiry shows that they stand towards each other as cause and effect. Admitting this to be well founded, it is unphilosophical to wonder at the extreme coldness of the body which attends the disease; whilst we are at the same time assured of the total suspension of those and other chemic-vital processes by which animal heat can alone be produced.

It has been observed, in numberless cases of Asiatic cholera, that no outward application of heat, and no internal administration of *ordinary stimulants*, will raise the temperature of the body in the slightest degree. The only appropriate stimulus, the only effective cordials, under such disastrous circumstances, are those which set in motion the functions of the great cardinal organs of the abdomen—they are the furnaces from which the vital heat is chiefly to be obtained. Ordinary stimulants may be subsidiary; but effectually to kindle their reaction, calomel or other mercurial preparations are, by the general consent of many scientific and practical men, the most powerful expedients with which we are at present acquainted.

The treatment of the third, or febrile, stage of the disease will resemble that of continued fever, and, more frequently than otherwise, that of the typhoid type. As we have to apprehend and guard against organic mischief in the brain, I should in all cases advise the head to be shaved, and evaporating lotions applied frequently to the scalp. Such simple expedients will often render depletion unnecessary. Leeches to the temples have sometimes been called for, and used with

benefit. We must not be inattentive to the state of the abdominal viscera, for it is there that the disease has in general committed the greatest havoc. The mucous tissues are those which have been most roughly treated, and we can hardly suppose, in the reaction which follows, that they are not exposed to imminent danger of disorganization. Their chance of escape may be materially increased by closely watching and obviating the symptoms of pain and tenderness as they arise: these are to be kept in subjection by local depletion and blisters. The continued use of calomel, in small doses, is commended by the best authorities on the subject. I should prefer, during this stage, the hydrargyrum cum eretâ, as a mild and unirritating form of the remedy, and peculiarly well suited to regulate and maintain the secretion of bile. Castor oil is a medicine of great value in this stage of the disease, since it combines a sedative and laxative property. The general experience corresponds with this opinion.

A medicine, which I have uniformly found beneficial in the typhoid fever of this locality, consists of an infusion or decoction of cinchona bark and nitro-muriatic acid, with which I have latterly combined the chlorate of potass. Out of from twenty to thirty cases of severe idiopathic typhus, which I have thus treated, the results have been uniformly favourable. I have endeavoured to show that an inactive state of the liver is one of the most prominent pathological conditions of cholera. It is well known that the nitro-muriatic acid has the property of acting upon, and promoting, the secreting powers of this organ. Now, although in the former stages of the disease, the latter remedy is inadequate to cope with the symptoms, at an after-period, when the streams of the circulation have resumed their natural courses, I believe there is no other remedy better calculated by virtue of its tonic, deobstruent, and antiseptic qualities, to invigorate and re-establish

the integrity of the digestive functions. The chlorate of potass is another medicine entitled to confidence in an adynamic febrile state of the system. The deterioration of the blood, induced by the epidemic cholera, provides us with a motive for the use of the latter substance, which will assist in restoring its healthy colour and constitution. Some may be inclined to think that the debility occasioned by the eongestive stage of the disease cannot be too soon counteracted by a liberal allowance of nutritious food. This is a grave error which ought to be strenuously reprobated: by falling into it, the vital spark is often extinguished by the premature incubus thus thrown upon it.

We must bear in mind that the organization of the intestinal mucous membranes is impaired, and that the process of nutrition (the commencement of which rests with them) cannot be easily performed until their integrity is restored. A practical, and appropriate injunction is conveyed in these few familiar words from Horace—

“*Vacuis committere venis, nil nisi lene decet.*”

The diet should be mild and simple at this period of the disease—fluid rather than solid. Amongst other suitable items, I may mention milk-whey, gruel, decoction of barley, rice, arrow root, sago, &c., and as the fever declines, light broths may be used; salt should be freely combined with the food, and whenever the powers of life flag, wine and water should be resorted to. The skin also requires our solieitude, and when hot and dry, should be sponged with tepid vinegar and water. As convalescence advances, the principle of avoiding an excess of food and stimulants should be kept still in view; for, by the irritation which they are likely to produce in a debilitated state of the digestive organs, the fever is very liable to be renewed. The use of solid animal food should not be resumed until convalescence is well established.

Such, then, is a summary of the various modes of treatment by which the Asiatic cholera may be conducted to a favourable termination ; and if any suggestions contained in this discourse should hereafter prove useful, I shall feel that my task has not been undertaken in vain.

THE END.

